

LOSI'S JUNIOR TWO ENFORCER: WEEDEATER POWER!

47380

Radio Control **CAR ACTION**

THE WORLD'S PREMIER R/C CAR MAGAZINE

**OUR TOP TEN
DRIVERS
OF THE
YEAR**



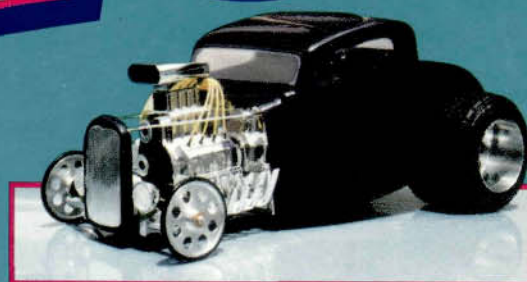
**WILD
CARS**

**PIT
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TOP 10



ACCESSORIES



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secrets of the 1/12-scale champ revealed

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CONTENTS

Volume 6, Number 5

May 1991

FEATURES

19
HOW TO BALANCE WHEELS
by John Huber
No more bad vibes!

23
CAR ACTION'S TOP 10
The envelopes, please...!

24
TOP 10 CARS
The baddest in the land

28
TOP 10 PHOTOS
What the Ayatollah wants, the Ayatollah gets!

30
TOP 10 ACCESSORIES
What you have to live; what you live to have

34
TOP 10 TOOLS
Start your Christmas wish list

36
TOP 10 DRIVERS
Ten really ugly dudes!

38
TOP 10 "PIT TIPS"
Ways to make your life easier

40
TOP 10 "READERS' RIDES"
You oughta be in pictures...

56
INSIDE THE WINNING CAR
by Steve Pond
Snoopin' in Mike Ebert's 12L

62
CLEVELAND INDOOR CHAMPS
by Steve Pond
Ballroom dancing was never like this!

88
CHIP HYDE: WORLD'S BEST R/C PILOT
by Tom Atwood
1990's Tournament of Champions winner

100
FLORIDA DIRT OVAL STATE CHAMPS
by Jim Shepka
Slippin' and slidin' down South

68
COX GTP NISSAN
by John Huber
What a gas!

80
ASSOCIATED SUPERSPEEDWAY 10L
by John Huber
Thin is in!

93
KYOSHO BURNS DX
by Ed Byron
A durable, 1/8-scale track-scorcher!

106
DIRT DIGEST
by Bill O'Brien & Bob Kane

152
TROUBLESHOOTING
by Steve Pond

DEPARTMENTS

6
EDITORIAL
by Steve Pond

8
LETTERS

10
READERS' RIDES

14
INSIDE SCOOP
by Chris Chianelli

50
PIT TIPS
by Jim Newman

105
COMING NEXT MONTH

176
WHAT'S NEW

210
AD INDEX



Top 10 Cars, page 24

112
WAREHOUSE HOBBIES TEAM ENFORCER
by Gerry Yarrish
Weedeater water rocket!

TRACK REPORTS

44
TEAM LOSI JUNIOR TWO
by Ed Schenk
The new standard in entry-level, off-road racing

COLUMNS

54
HOT TRACKS
Performance Raceway, Honolulu, HI

74
SCOPING OUT
by John Rist
Novak 410-MXc

ON THE COVER: Top left—Team Losi's Junior Two; top right—Enforcer weedeater-powered boat. (Photos by Yamil Sued) Middle left—Masami Hirosaka, one of the Top Ten drivers (photo by Richard Weed); middle right—Schumacher's awesome Pro Cat (photo by Steve Pond). Top Ten inset—Team Losi's JR-XT (photo by Steve Pond). Lower left—flame-throwin' Clod (photo by Scott Branche); lower right—Airtronics Caliber 3P, Steve Young's posin' "Readers' Ride," Mike Ebert's winning car.

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EDITORIAL

by STEVE POND



REINVENTING THE WHEEL

GETTING OUR CARS OR TRUCKS to handle as well as possible is a big part of R/C racing. For optimum handling, you might need a few modifications or after-market parts, but these tricks and "trick" parts have become a Pandora's box for some.

In search of the ideal setup, many of us do what others are doing to their cars. I often see people walk into a hobby shop to buy a car or truck and come out with modification parts that cost as much as another car kit!

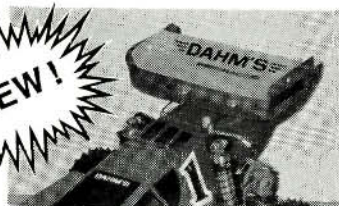
Whether by a shop owner or a fellow racer, many of us are led to believe that if we don't make changes to a stock kit, we simply won't be competitive. The fact is, many of the cars we buy are purpose-built racing machines that have been designed by some of the best minds in the business!

My point?—you don't re-engineer race cars; you *tune* them. Give your car a chance to impress you before you pull out the hacksaw, or—even worse—your wallet. Only after you've run your car for a substantial time should you consider making modifications. If you start with a highly modified car, you'll never know how well the stock version might have performed! ■

DAHM'S

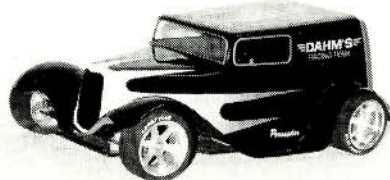
Racing Bodies

NEW!

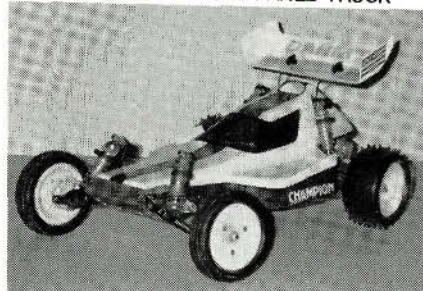


FX RACING WINGS

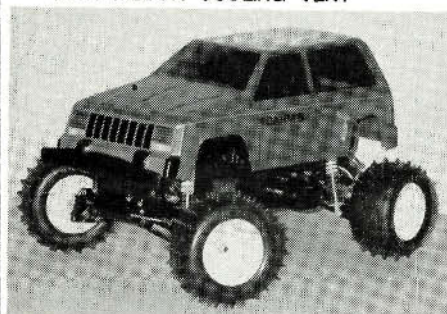
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LETTERS

We welcome your comments and suggestions. Letters should be addressed to "Letters," Radio Control Car Action, 251 Danbury Road, Wilton, CT 06897. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we cannot respond to every one.

PEGLER SURRENDERS

In the last few months, monster-truck enthusiasts have sent many letters that bash the opinions I expressed in my letter to *Car Action* (October '90, page 26). I don't object to their letters, because they have a right to state their opinions on stadium trucks versus monster trucks, too. I've kept an open mind about everything they've said (my ego isn't so big that I can't admit when I'm wrong), and I'm writing to say that I now think a production class would be a good idea. It would certainly be a good way to get more people involved in this sport.

For a production-truck class to be successful, however, I still think that a few restrictions will be necessary. For example, the class should be limited to stock motors powered by 6 cells, and I don't think there should be a separate class for monster trucks with after-market trannies. I do think, however, that stock chassis and suspensions should be kept. I don't want to impose these ideas on anyone; I just want people to know where I stand.

Although the readers strongly defended their beliefs that a production-truck class was a good idea, I had reasons for my opinion. The stadium/monster truck issue is confusing. In case no one has noticed, R/C "stadium trucks" are open-wheeled, and full-size stadium trucks are closed-wheeled. In addition, R/C stadium-truck racing hasn't always been what it is today. The first conversion trucks were nothing more than RC10s with Blackfoot tires. (There's a good example of this on page 118 of the January '91 issue; it's an RC10, but it certainly looks like monster truck!) Stadium trucks are now lower, faster and look more like the Mickey Thompson vehicles that race around football stadiums. What separates monster trucks from stadium racers is still confusing. I could go on, but I wouldn't want to bore you.

For me to change my mind, I had to

look at a monster truck and stadium truck, side by side; then the differences came shining through. Although stadium trucks don't participate in sled-pulling events, I'd welcome monster trucks in the most popular form of R/C car competition.

ROB PEGLER
Scottsdale, AZ

Rob, it takes a big man to admit he's wrong. Now, can we drop the subject and move on to other arguments? CC

LOCAL CONTROL IS THE ANSWER

Here's another letter to add to the monster/stadium truck-racing controversy. Because I'm not involved in this aspect of the hobby, I figured I could stay objective. I just have some ideas.

People like Elliot Williams (who first said "...these two forms of racing just aren't interchangeable," and then said "separating monster trucks from racing trucks isn't a good idea") are killing this part of the hobby. Their attitude is, "What's racing without the agony of defeat?" I think I have an answer to that question, Mr. Williams.

Kids (the majority of the monster-trucking population) who race monster trucks will start to realize they don't have a chance against stadium trucks. Then they'll become discouraged and stop racing. Soon, truck sales will drop to rock-bottom and, before you know it, monster trucking will be as dead as 1/12-scale!

Is there a solution? Certainly! I suggest that monster-truck groups in each club vote about what they want to do. This leaves it up to individual groups. They might even vote on doing something fun like having an obstacle course with car jumps (using old, beat-up car bodies donated by racers), mud bogs, brick pulls, gravel pits, etc. (Something like that would be so much fun that I might even get involved!)

If you want to keep the classes together, then I'd like to see stadium trucks keep up with monster trucks in the monster-truck class! Ever see a slimed, grimed, and muddied JRX-T? Keep trucking, guys and gals!

GABRIEL LEDFORD
Coopersville, MI

Once again, solving the problem on the local level is the answer. Don't expect others to do it for you! CC

HIGHLY INTERCHANGEABLE

I recently noticed that, with the introduction of the JRX-Pro, the JR-X2 has been practically wiped off the market. I don't mind as long as it's being replaced by an improvement, but are the two cars' parts interchangeable? If I break a link in the rear suspension of my JR-X2, will replacement parts be available, or will I have to buy the JRX-Pro's new suspension? Also, I have an Aristo-Craft electric speed controller (model no. SP-1500) that only works in reverse. What I should do with it? (It's very hard to get it fixed where I live.)

TONY G.
Ocala, FL

Tony, the great thing about Losi off-road cars and trucks is that all of the parts are interchangeable. Your Aristo controller only works in reverse, because the forward FETs are probably fried. Send it back to the manufacturer for repair. CC

TELEPATHIC PEN PAL

I'm an R/C racer from Finland. (I heard you thinking, "Where is that?") I own an Ultima Pro XL, a Lazer ZX and an RC-12L, and I've been racing for about 1 1/2 years. In one Finnish race, there were about 150 racers (stock and modified)! Could you do a shoot-out between the

Lazer, the YZ-10 and the Pro Cat? Also, I'd like to have U.S. pen pals, so could you print my address? Your mag is the best!

TONI RAHKO
Kilkkaistentie 17-19 A5
01800 Klaukkala
Finland

I don't think Toni can really hear us think; if he could, he wouldn't need a pen pal! Why don't one of you "lazos" write to him and broaden your horizons?! CC

EAGLE EXCITEMENT

I was thoroughly impressed by Chris Chianelli's "Track Report" in the December issue, and I'm now the proud owner of a TRX-T Eagle. Thanks for the input, Chris—the Eagle is topnotch! I'm still waiting for "Project Strike Eagle" (it'll be along soon, I hope), and I'm also wondering what happened to the rest of the "Track Directory" in the January issue (valuable information)? Otherwise, great mag! Keep up the good work.

STEVE KNOUSE
New Columbia, PA

Steve, I'm glad that the report helped you out. The "Track Directory" is now so big that we can't print the whole thing every month. We print what we can, and if we only get to the letter "M," then we start with the letter "N" the next month, and go as far as we can. CC



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READERS' RIDES

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If the Ayatollah chooses your photo, you'll receive a one-year subscription to Car Action, or an extension to your existing subscription. You'll also be eligible for the third annual "Reader's Ride of the Year Contest" in the fall of 1991. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.

HANG TIME

Floating through the air like this isn't easy! Just ask SPC Andrew Spohn, who's stationed in Nürnberg, Germany. With little to do, Andrew and his buddies have come up with a new R/C challenge: they jump their cars over a curb, across a stretch of grass and onto a parking lot almost 6 feet away. His

Blackfoot is mostly stock, but Andrew has a choice of a Twister 13-turn or a Trinity 9-turn motor to get it up to takeoff speed. The power comes from a 10-cell battery pack. Andrew's B'foot recently showed up on high-altitude military radar!



EDDIE'S NIGHTMARE

When you think of Pro-Stock, names like Glidden, Johnson and Alderman come to mind. Their 500ci monsters can accelerate to 185+mph in just 7½ seconds! R/C has its own version of the Pro Stock Class, and one of the sharpest-looking entrants belongs to Edwin Diaz of Brooklyn, NY. Based on a scratch-built chassis, the car

is equipped with a Trinity Big-Daddy II motor, a Novak 828 ESC and a set of matched 900mAh SCR's. The scale details include Parma's Hemi 426 engine and a Bólink Dodge Daytona IROC body. The "trick" paint job is the perfect complement to the rest of the equipment.

A STRANGE PLACE FOR AN AUTOGRAPH!

The Indy 500 is considered to be the *premier* event in motor racing, and it's *the* place to be during the last weekend in May. Maurice Grunfeld (of New City, NY) wanted the experience without the expense, so he created his own Indy competitor—an R/C version of Danny Sullivan's 1990 CART ride—the Marlboro Penske PC-19. Under the rad body is a race-prepped RC10L, a Novak ESC and a Reedy motor. The body is authenticated by Danny's signature, which Maurice got at a race that coincided with the Meadowlands Grand Prix!



AN OLDIE BUT GOODIE

Matt Harris of West Bath, ME, is ready to rock with this camouflaged warrior! An old Wild Willys, this car has seen more than its fair share of abuse. To put some spirit back into it, Matt added a Trinity Monster Stock motor, a set of 10 working lights and an AM/FM stereo! He custom-wired a Walkman inside and mounted the speakers (built out of a set of headphones) in the corners of the roll bar. Even with a few years under its belt, this jeep is ready to handle whatever the wasteland can dish out!



A REAL WINNER

This great car/trailer combo is the handiwork of Ray Earp of Danville, VA. The car is a Thunderbird painted like the 7-Eleven NASCAR; under the body is a TRC Pro 12 chassis. With a CAM motor providing ground-pounding horsepower, a Tekin ESC controlling the flow of juice, and a Novak receiver handling the signals, this car is sure to be in the lead pack in any race. Ray has already won many awards with it—from 1st in concours to the dreaded "Headache Award." Trying to replicate this combo would certainly give me a headache!



A TOUCH OF CLASS

Richard Sloan (of Howell, NJ) had seen so much glitz, flash and sparkle that it was making him sick, so he chose a back-to-basics, plain yellow—but sharply detailed—body for his latest car. Lurking underneath is a Trinity motor, which supplies the ponies to the rear wheels by means of a Robinson spur gear and a finely-tuned tranny; a Stormer gear bracket helps to prevent gear meltdown. Just goes to show—you don't have to be flashy to be a tough competitor!



AWESOME BILL FROM DAWSONVILLE

Jerry Kjensrud of Hillsboro, OR, owns this modified Lynx II. With a Tekin 411P-ESC, a B&R Magnum Motor and Max Cells batteries, this car is definitely on the fast track. What really sets it apart from the rest are its exterior details (including a set of BBS-style aluminum wheels) and the Ford Thunderbird body, which is painted in the classic red, white, blue and gold of Bill-Elliott's Coors #9.



SIX PACK

Bad Brain's famous "Behemoth" was the inspiration for this wild Clod-Buster created by Bill Slattery of Fairview, NJ. It's powered by three Black Magic motors, and Robart 505 and Futaba MC112B speed controllers provide the motivation from 29 cells! Bill extended the Ford Blackfoot body with "glue, body putty, patience, sanding and finishing." With six-wheel steering, this truck can make a 360-degree turn in only 6 feet! "Slattery's Hurricane" is definitely a Clod and a half, and it should be great in truck-pulling competition!

INSIDE SCOOP

by CHRIS CHIANELLI



As directed by the Ayatollah of Radio Controlla, Commander Crash Chianelli reports back to the faithful followers of the Grand High Exalted with pertinent information! I'm back from my latest espionage excursion with microfilm, spy shots and stolen communiques that read as follows:

Matched



Resistance

Trinity Pushed Packs have been updated! The new packs are still matched by voltage and run time, but according to Trinity, they now carry an internal-resistance number on their label for improved matching. There's no change in the price or part number; the only visible difference is the new pink label and the sixth number.

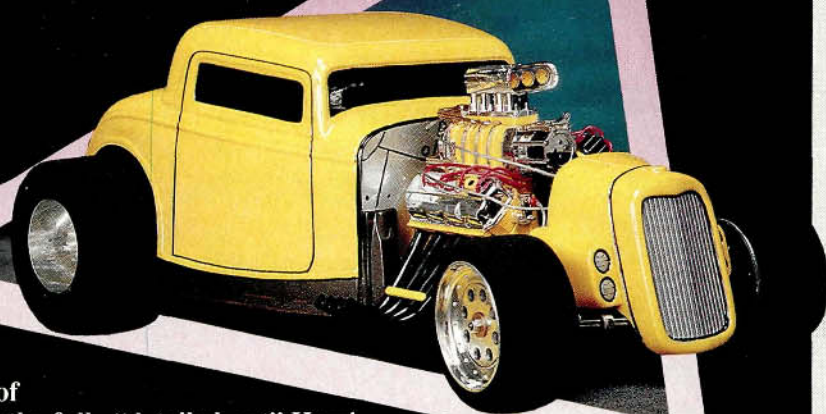


methanol minis

Cox Hobbies has applied the design and components of its well-known GTP Nissan to these new Stock and Indy cars. New for '91 on the .049 powerplant is the Maples EGR (exhaust-gas recirculating) throttle system. According to Cox, this system provides a lower, more reliable idle and a smoother transition to top rpm, so you can expect faster lap times. Fully proportional throttle and brake control should deliver improved handling, too.



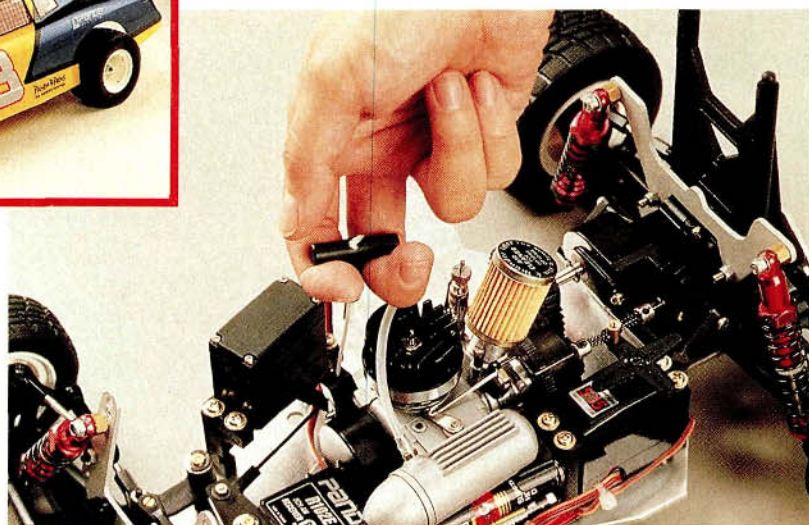
She's My Little Deuce Coupe...



This Parma Hemi Coupe is based on the California Sport Truck and the "Days of Thunder" chassis. The kit doesn't come with the fully "detailed-out" Hemi, but Parma offers a wire and braided hose kit (no. 10411A), so you can jazz up the basic Hemi engine kit (part no. 1041) that is included. The generic '30s coupe body includes a custom grill, a detailed firewall and an authentic undercarriage with cross-beams and linkages. The kit also includes fat rear slicks.



Joining the 1/10-scale Panda Stadium Truck is Global Hobbies' newest offering—the glow-powered Monte Carlo. Like the stadium truck, the Stocker comes with a



pull-start Magnum .10 engine; fully independent suspension; aluminum, oil-filled, coil-over shocks; a shaft drive; and scale-like, on-road, rubber tires. The Monte Carlo should be available very soon, so be on the lookout.

FUEL STOCK

This 2WD, 1/10-scale off-roader comes fully assembled with aluminum shocks, chassis and towers, yet it's surprisingly affordable. I know little else



the raceman cometh

about this car, but for an inexpensive model, it seems to have some interesting performance features, e.g., adjustable upper links. The importer—Jessie V. & Brothers (4042 Kingsport Dr., Orlando, FL 32809)—claims that the Raceman is very durable. Naturally, I'll try to uncover more facts.

When the results of the Reedy/Sanyo International Race of Champions were finally tallied, Masami Hirosaka took the 4WD class with his Yokomo and calmly stomped the 2WD competition driving an RC10. When they added the subtotals of the two classes, he came out a cool seven points ahead of Cliff Lett!



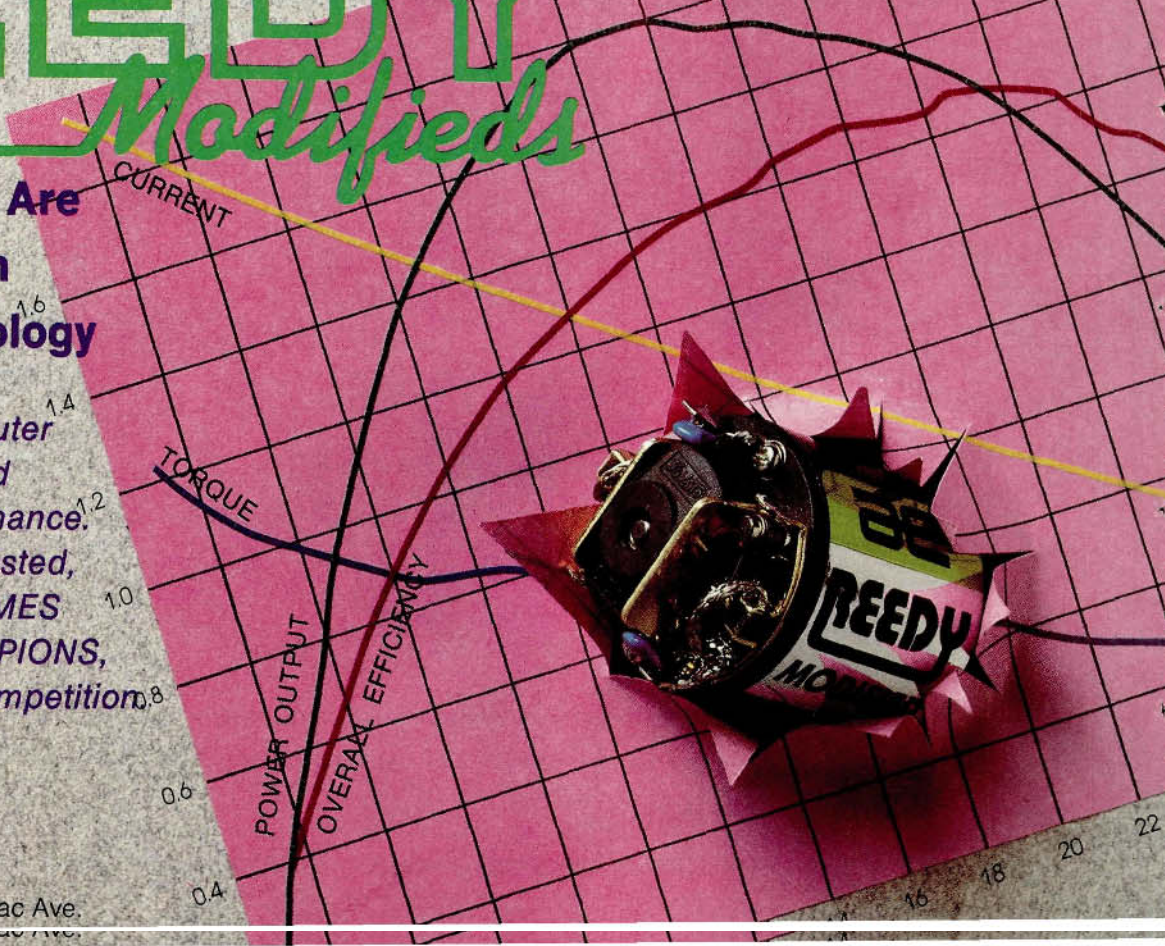
According to its distributor, Arrow Italia's new, 1/10-scale off-roader is "being tested with successful results in Europe and Australia." The car has a unique A-arm design, aluminum oil-filled shocks, a Syncro belt drive and a chassis

REEDY Modifieds

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(Graph shown represents actual computer readout of Reedy Modifieds motor.)





masami mops up

Y

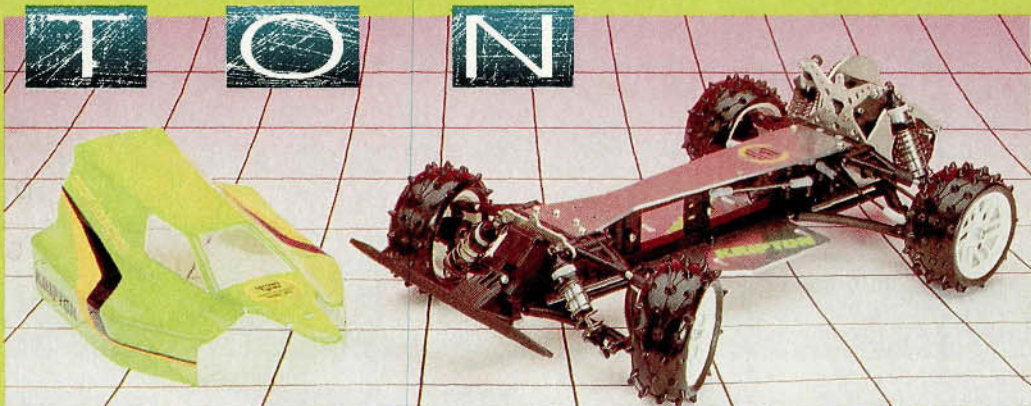
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made of "Ergal," which is reported to be very strong. The Krypton will be available in 2WD and 4WD versions (both are convertible), and we'll have a full track report as soon as they hit the States.



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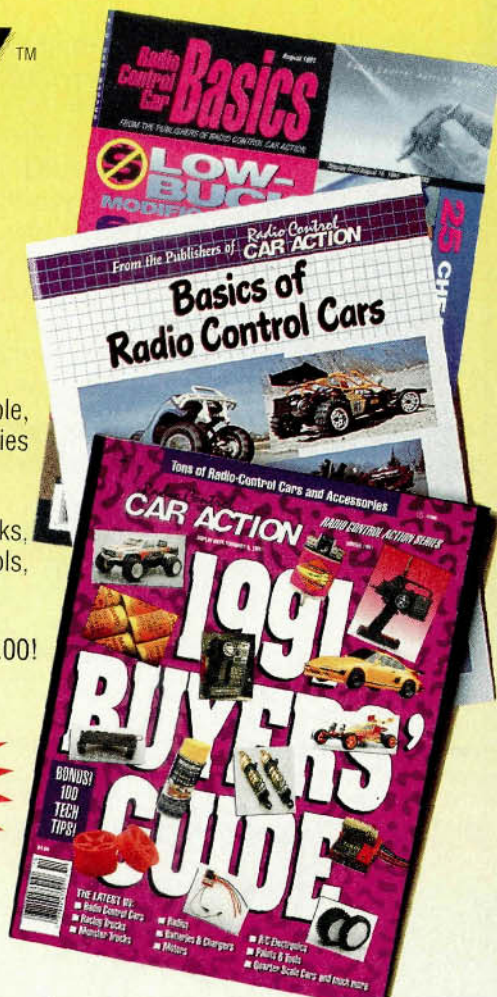
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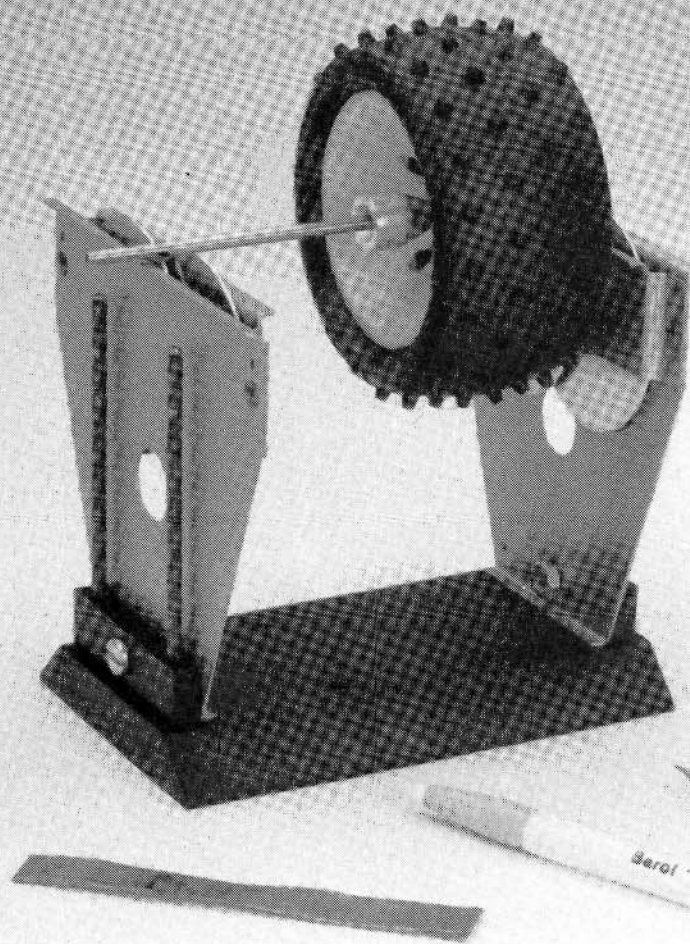
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HOW TO BALANCE WHEELS



by JOHN HUBER

HAVE YOU EVER noticed that your car vibrates when you hold it up and apply the throttle? If you have, you're not alone. Ever wondered why it happens? Read on!

Proper wheel balancing is one of the most overlooked factors in R/C racing. If you travel at just 30mph in a full-size car with unbalanced wheels, you'll have a very bumpy ride. A tire that loses contact with the road is also unsafe! Since R/C cars travel as fast as 70mph (that's a *scale* 700mph!) on some tracks, it isn't surprising that wheel balancing is important, and there's a new, easy, reliable

way to do it—and it works on all types of wheel!

GETTING THE PROPER BALANCE

First, figure out which side of a wheel is heavier. To do this, you'll need a prop balancer. High-Point* makes a nice unit

wheel (or prop). Mount the wheel on the shaft, put the shaft on the balancer, and give the wheel a spin. A correctly balanced wheel won't stop with the same part at the top every time; but if it isn't perfectly balanced, the heavier side will always end up at the bottom.

When the wheel stops spinning, use a grease pencil to mark the tire's sidewall at its highest point. The heaviest portion of the wheel will be at the bottom. The mark on the highest side of the tire shows the lighter side where weight must be added to obtain proper balance. Double-check the balance by spinning the wheel to see if your mark

ends up on top again. Add weight to the side of the wheel you marked with the grease pencil. Add the weight a little at a time, and continually check the balance so that you'll be able to determine when you've added enough weight.

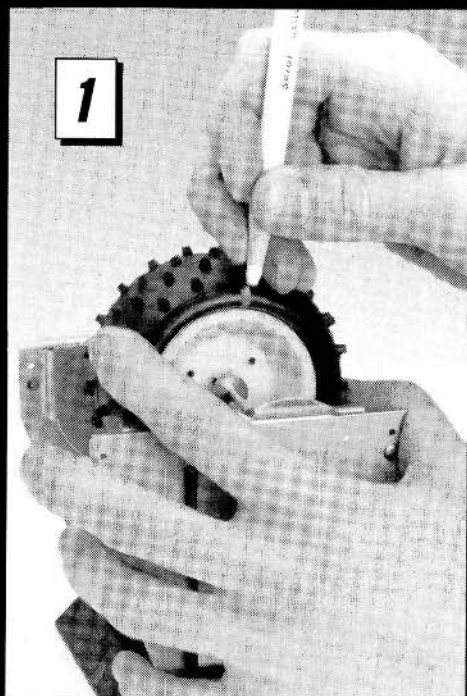
What should you use for weight? You could try straight pins, but they're only suitable for foam or rubber-cap tires, because the pin is inserted just above the rim, and using several pins can lead to problems. You're slicing into the foam, and this weakens the bond between the tire and the wheel. This may lead to chunks of the tire separating from the rim in a crash. This method can't be used on truck or buggy

BRAD
Vibrations

that was designed for airplane and boat props, but works well for wheels, too.

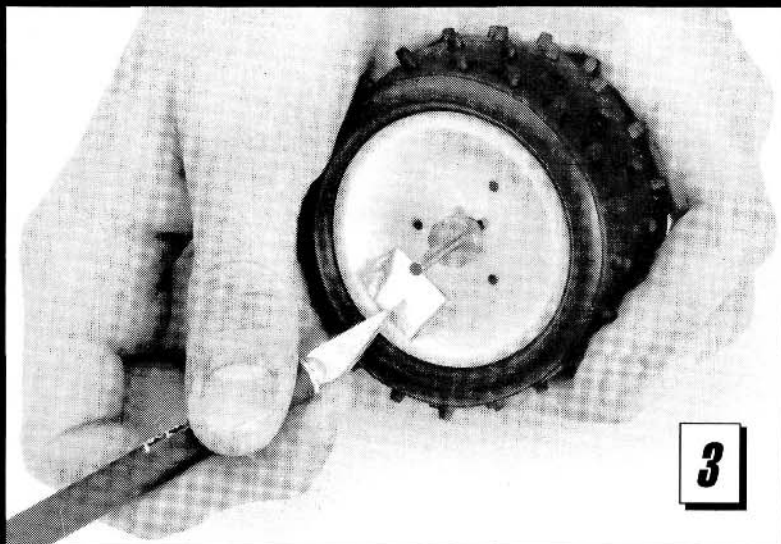
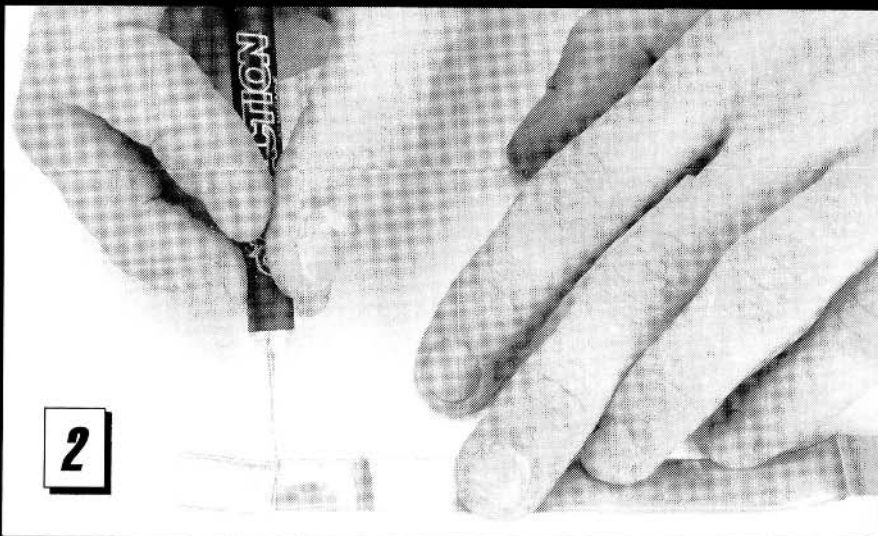
The balancer has an 1/8-inch shaft and two cones that allow you to balance any

HOW TO BALANCE WHEELS



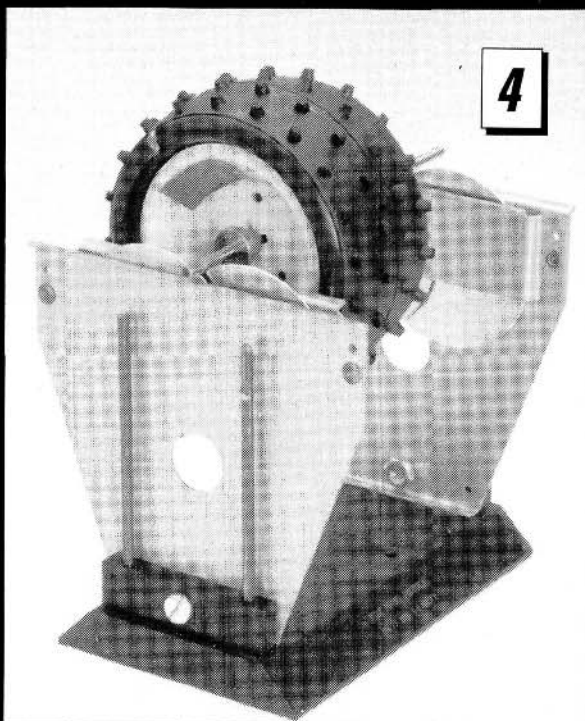
◀ 1. When the wheel stops spinning, mark the top with a china marker. This is the light side. To balance the wheel, add lead tape to the rim on this side.

2. Use an X-Acto knife to cut a piece of lead tape, and then take it off its backing. I usually start with a $\frac{3}{4}$ - to 1-inch piece. Try not to touch the sticky side; you'll spoil the adhesive, and this will cause the tape to lift. Pick up the tape with the tip of a knife.



▲ 3. Put the lead on the rim directly below the mark you made on the tire. To ensure good adhesion, the rim must be thoroughly clean. Rub the tape down with your fingernail.

4. Now check the tire to see how close it is to being balanced. If the mark still lines up at 12 o'clock, add more tape. If it's at 6 o'clock, remove a little. If, after a few rotations, the mark stops at random points, you're right on target.



wheels, because they're hollow, so there's nothing for the pins to stick into.

LOOKING FOR LEAD!

I decided to try lead as a balancing weight, but the lead sold in most hobby shops is too thick, so I headed to a local auto-parts shop in search of lead tape. Although they didn't have what I was looking for, they told me that golfers sometimes add lead tape to their golf clubs, and my local sporting-goods store had just what I was looking for—and at a reasonable price.

A 3-foot strip of .0075x.5-inch lead tape costs about \$2. On one side, there's a very sticky adhesive that definitely won't fail.

A 1-inch piece of the tape weighs a mere .015 ounce, so it's easy to add weight in small increments.

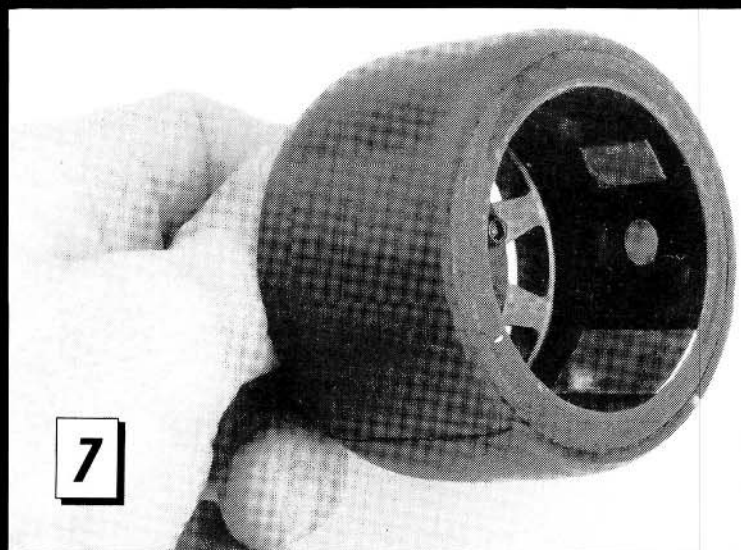
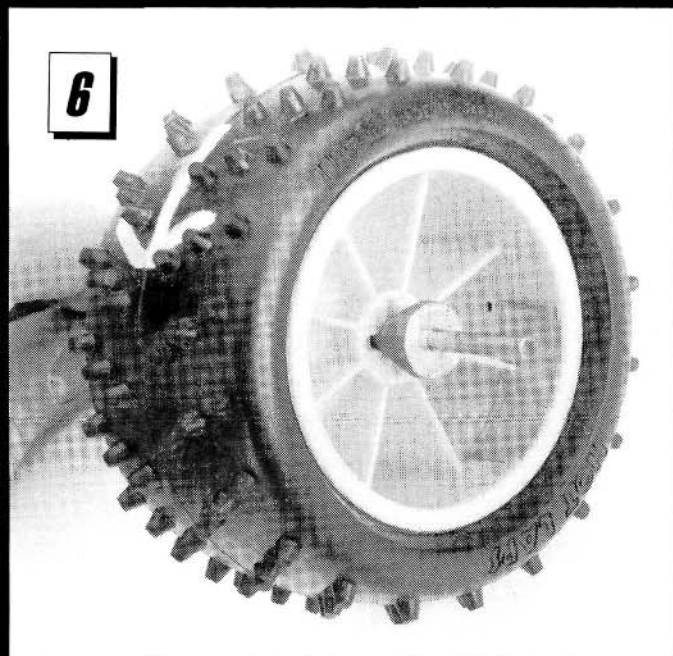
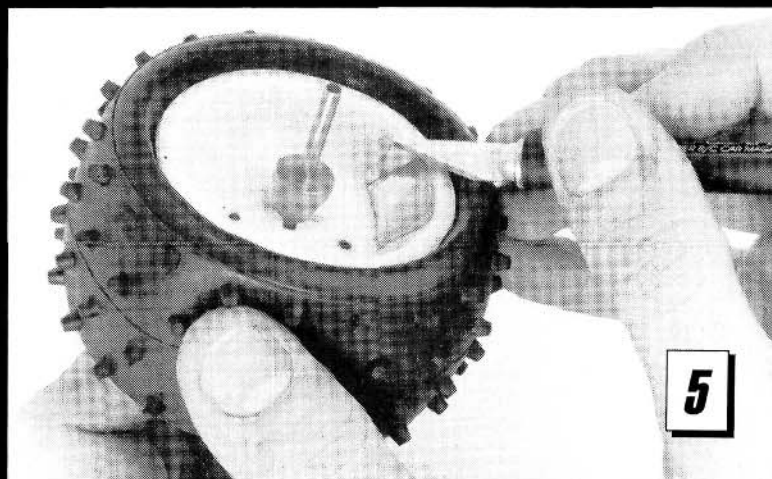
Before you add any weight to truck or buggy tires, you *must* glue the beads to the rim. This will prevent the tire from slipping on the rim and changing the balance. (Remember: the tire and wheel are balanced as a unit.) It's also helpful to make a small hole in the tire's tread to prevent any flat spots from developing and allow dirt to exit (if necessary). Now it's time to start balancing.

USING LEAD

Slice off a little of the lead tape (use an X-Acto knife). Start by

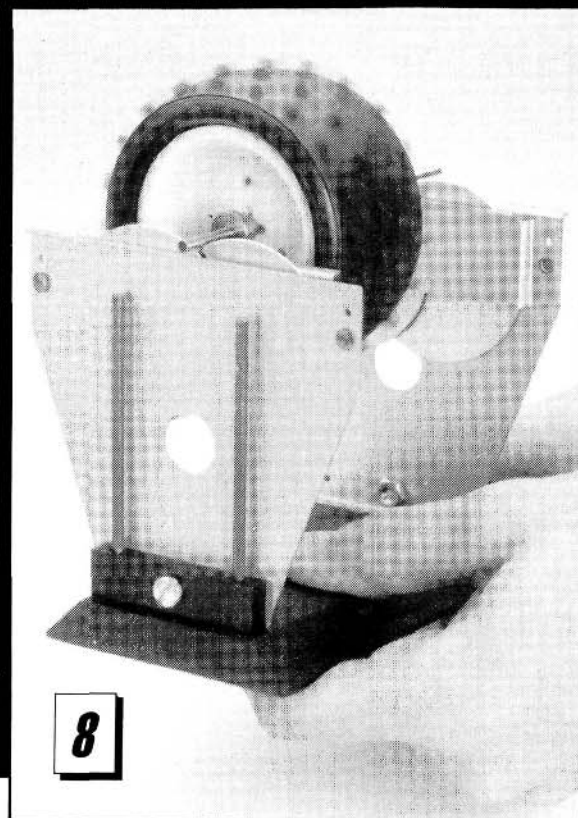
6. Here's the same lead tape used on a different style of rim. Notice the cone on the shaft, which will easily accommodate most $1/10$ scale, on-road and off-road wheels.

▼5. If you added too much tape, you can easily remove some. Cut off small pieces until your wheel is balanced.



▲7. For rear pan-car rims, you must use a wheel hub. Before you mount a wheel on a hub, make sure it's balanced.

8. Here's an easy way to assess wheel vibration. While holding the balancer and keeping the shaft level, give the wheel a good spin. You'll be amazed at the amount of vibration you can eliminate!

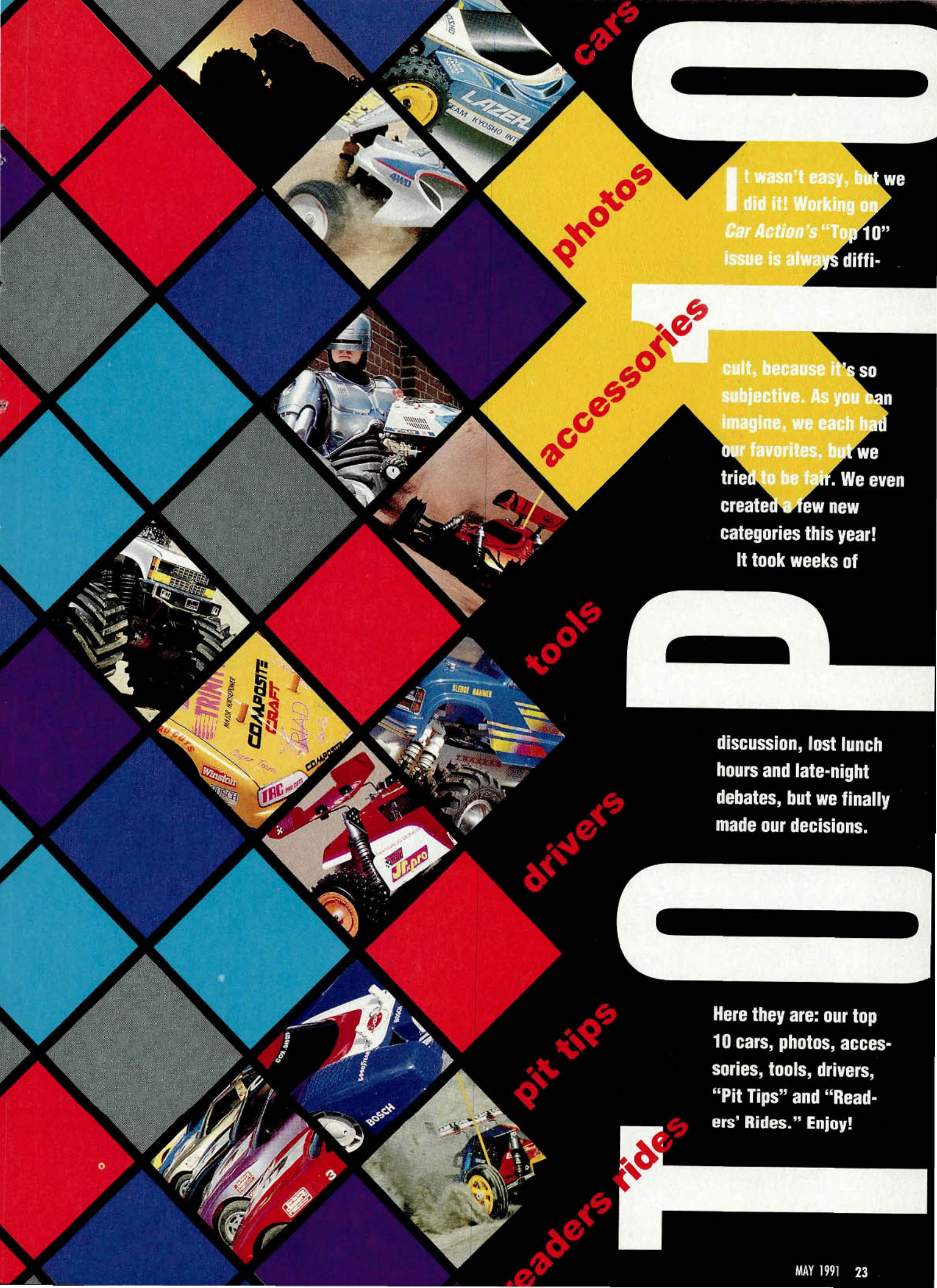


putting it on the inside of the rim where you marked the lighter side. Now spin the wheel. Is there any difference? If your mark still returns to the top, you should add more weight. On the other hand, if the marked side falls to the bottom, you've added too much. With practice, you'll soon be good at calculating how much tape you need.

You might have to add weight to more than one place. The more unbalanced a wheel is, the quicker it will return to its heavy-side-down orientation, so if it seems to take longer to stop spinning, you're getting close. As a final test, spin the wheel as fast as you can while you're holding the balancer; is there any shimmying or shaking? You should notice a big difference.

What will balancing your wheels do for you? Well, not only will it make your car faster, but it will also improve traction and increase the life of your bearings and drive shaft. Balance your wheels before your next race. If you run a buggy, a pan car or a racing truck, the difference will amaze you! After all, the more time your tires spend on the ground, the more you'll get out of them.

*Here's the address of the company mentioned in this article:
High Point Products Co., 3013 Mary Kay Lane, Glenview, IL 60025.



cars

photos

accessories

tools

drivers

pit tips

readers rides

It wasn't easy, but we did it! Working on *Car Action's* "Top 10" issue is always diffi-

cult, because it's so subjective. As you can imagine, we each had our favorites, but we tried to be fair. We even created a few new categories this year! It took weeks of

discussion, lost lunch hours and late-night debates, but we finally made our decisions.

Here they are: our top 10 cars, photos, accessories, tools, drivers, "Pit Tips" and "Readers' Rides." Enjoy!

It's never exactly quiet in the Car Action offices, but when we get together to choose the Top 10 Cars, the level of noise raises eyebrows all over the building. This year's debate was one of the most heated ever! After lots of discussion, we came up with these picks. Each car has excelled on tracks and in backyards across the country, and each deserves to be in this select group.



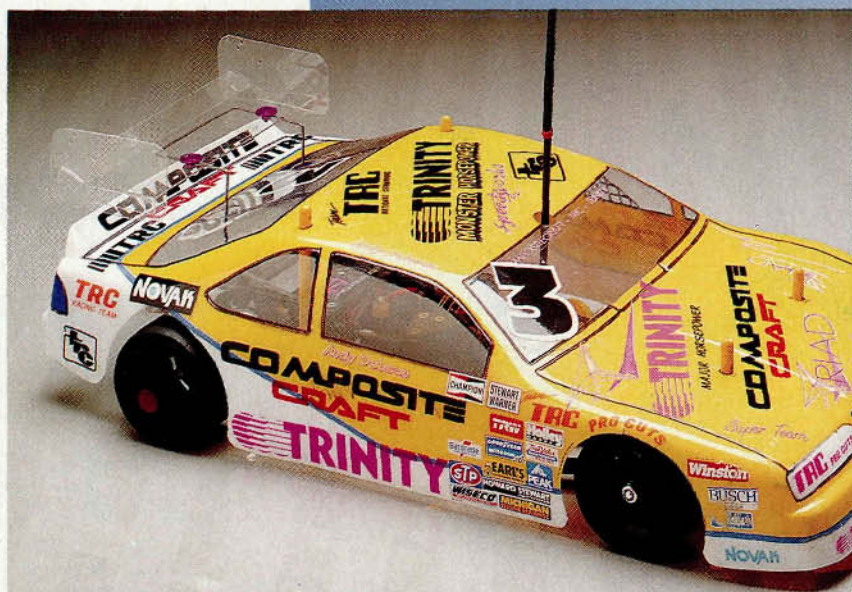
4WD MONSTER TRUCK



Kyosho USA-1

The USA-1 is the first 4WD monster to end the 3-year reign of Tamiya's Clod Buster! Like the Clod, the USA-1 has over 6 inches worth of terra tires, twin motors, 4WS, and it requires no special radio equipment for proper operation. But wait—there's more!

The USA-1's suspension is fully independent, with upper and lower A-arms for greatly increased travel. The included Mega 360 truck motors are stronger than the Clod's standard Mabuchi 540, and they give better acceleration and top speeds. Some of the USA-1's design features are similar to those used in previous Kyosho trucks, so many of the parts are interchangeable. With all the ingredients of a true monster, the USA-1 has the added advantage of performance and reliability.



CompositeCraft/TRC Lynx II

The Lynx II made a mark for itself last year, proving that it isn't just a modified version of the Predator Lynx, but rather a totally new, unique system. Its rear suspension is truly a great piece of work. The motor pod is connected to the rest of the chassis by means of an A-arm and adjustable control links. This design is what helps the Lynx II to do so well on bumpy tracks. The kit comes with a small Delta shock absorber, but a Trinity purple shock is available for increased travel and damping. TRC also makes a fully adjustable front end that allows you to adjust the Lynx II's caster and camber. This car is one fine machine!

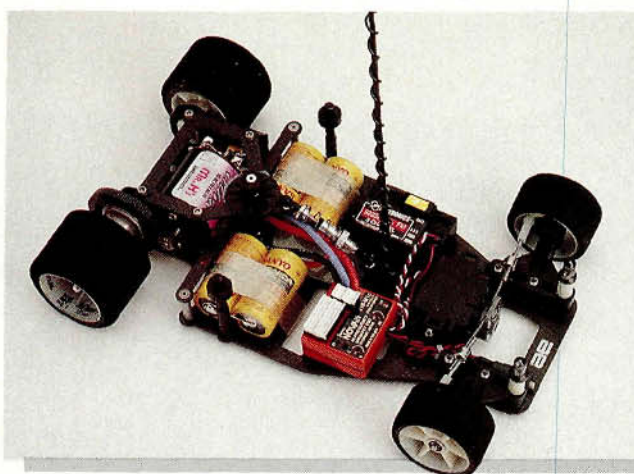
1 / 1 0 0 N - R O A D

Tamiya Manta Ray

Four-wheel drive isn't usually for beginners. Sure, 4WD cars are more forgiving and less likely to spin out, but they're often more expensive and complicated to build. Tamiya's brand-new Manta Ray is another story. Although it's one of the least expensive 4WD cars on the market, it has many great features. Oil-filled shocks provide damping at all four corners, and the unique honeycomb chassis design reduces flexing. Tamiya's excellent instructions will help new builders to make their first 4WD car a success.



4 W D E N T R Y - L E V E L



Traxxas Sledgehammer

The most popular monster trucks are 2WD; they're affordable and, because of their simplified drive trains, they're usually easy to build. The Traxxas Sledgehammer is our pick as tops in this class.

For starters, the Sledge is available ready-to-run, or as a kit. The RTR version comes complete with a pistol-grip radio, an electronic speed controller and a body that's trimmed and ready for paint.

What really distinguishes the Sledge from other trucks in its class is the quality of its materials and components. Many of the parts are made of glass-filled nylon that's similar to what's used in expensive racing machines. The Sledgehammer's race-bred features include oil-filled, coil-over shocks, independent suspension and a tough tub-type chassis made of nylon, ABS plastic and aluminum.

The Sledge certainly didn't lack competition in our voting—there are plenty of good kits available in this category—but when you consider all of its features and the versatility of its design, there's none better.

1 / 1 2 O N - R O A D

Associated 12L

When you think of 1/12-scale racing, you think of the Associated 12L. As a three-time IFMAR World Champ, many-time National Champion and a winner at tracks across the country, this car has more than proven itself in competition. This year, a revised model was introduced.

Gone is the spring-and-rod rear suspension, which has been replaced by a Delta-type shock mounted in the same way as the one in the 10L. The rear cross-brace, which was first used in the 10L Superspeedway, prevents the center post from flexing under stress. Also included are new, triple-screw suspension blocks to replace the old double-screw models. With these improvements, the 12L should continue its winning ways in 1991!

2 W D M O N S T E R T R U C K





Team Losi JRX-Pro

Team Losi's new JRX-Pro is one serious contender! Based on the design of the JR-X2, it has a host of new parts that improve its performance, including longer front and rear shocks, solid bellcranks, rear H-arms, a new battery holder and a new rear bulkhead. For such an advanced machine, the JRX-Pro is easy to assemble, and the many readily available replacement parts will keep you on the track.

Team Losi JR-XT

To many, the JR-XT would seem to be a natural choice for "Truck of the Year" in the racing class. Since its introduction, the JR-XT has dominated in both performance and sales. There were a few more trucks competing for the title this year than there were a short time ago, but fear not; the JR-XT remains the most versatile high-performance monster machine available.

The JR-XT's features are similar to those of Losi's X2 and X-Pro because it's based on the design of these two highly successful racing machines. The beauty of the XT is that most, if not all, of the parts developed for the cars can be used on the truck as well.



RACING TRUCK



Tamiya Madcap

You want your first R/C car to be as easy to assemble as possible; you also want its performance to be better than that of a toy. Enter the Madcap, Tamiya's entry-level 2WD machine.

This car has a tub-style chassis, four-wheel independent suspension and, best of all, a ball differential. This is Tamiya's first ball diff, and it works very well. To keep the price reasonable, there are plastic bushings instead of ball bearings.

As beginners advance, they can upgrade the Madcap with parts from the Astute, e.g., oil-filled shocks and ball bearings. As with all Tamiya kits, the instructions are topnotch, so assembly won't be a problem.



2 W D E N T R Y - L E V E L

Kyosho Lazer

If you want to go fast in off-road racing, 4WD cars are the only way to go, because they can handle the strongest motors in low-traction situations. Out of the box, the Kyosho Lazer is the best 4WD car there is.

At the heart of the Lazer is a basic mid-motor design that dates back to the Optima Mid. Power is fed to the front and rear by twin belt drives, and the differential action is handled by twin gear diffs. Although they aren't state-of-the-art, the gear diffs are aided by twin slipper clutches (one for the front, another for the rear), and they perform well.

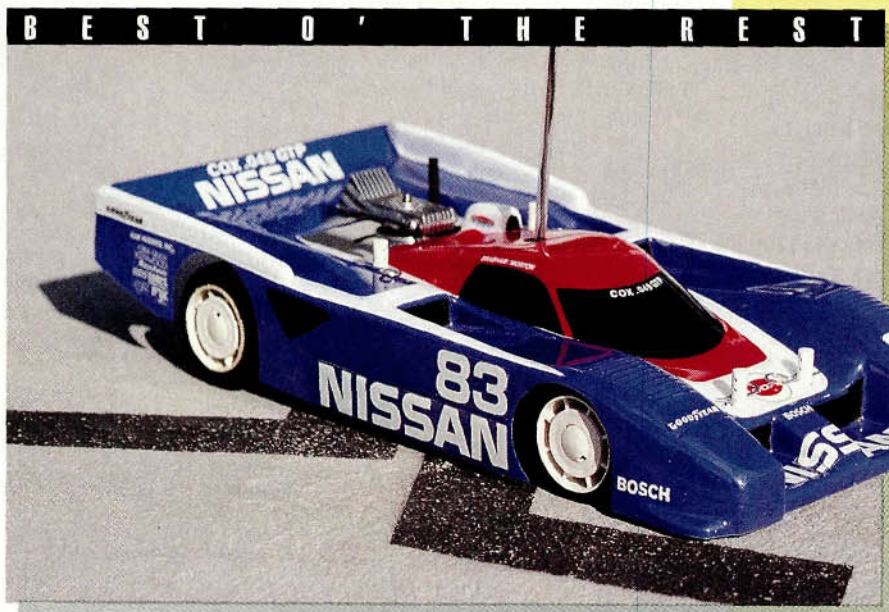
The suspension is of the long A-arm/narrow-chassis design; adjustments are easy to make; and with four of Kyosho's famous Gold shocks damping the bumps, the Lazer is one of the most able cars in the business.



Cox GTP Nissan

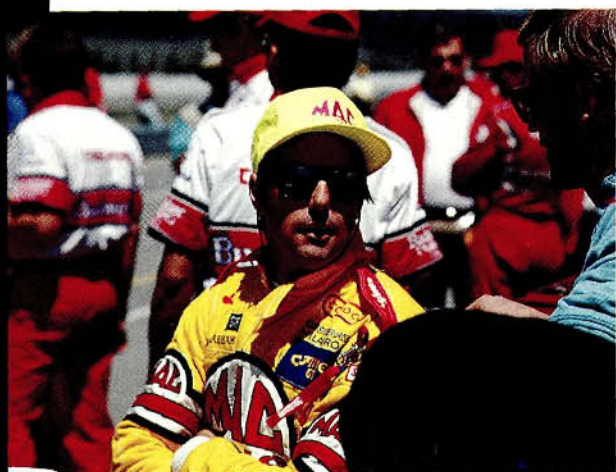
Although the Cox Nissan isn't all "tricked out" with a graphite chassis or an exotic suspension system, it does have unique features that interested us. For someone who wants to learn about fuel-powered cars, it offers the easiest way to get started. The car, radio, starter and engine are all included in one package, and this makes assembly a breeze. The car's speed is good, but it isn't so fast that a beginner would have a difficult time learning how to drive it.

Although fuel-powered cars sometimes have starting problems, beginners have to start somewhere, and it's a lot easier to start with a .049 engine than with a .21-size engine that needs an expensive electric starter. This car is a lot of fun for the money, and that's why we chose it as the Best o' the Rest.



photos

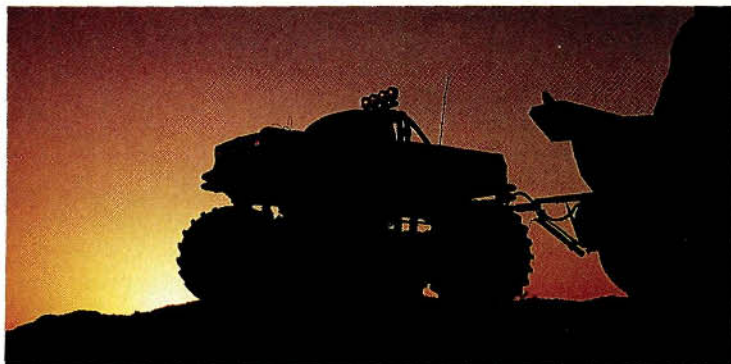
Car Action photographers are battle-scarred veterans of the R/C front! When the Ayatollah of Radio Controlla spews that fatal directive—"Get the shot, whatever it takes"—you know you have your work cut out for you, and there can be no compromise in quality. We've been seen crawling on our bellies on surfaces that range from 130-degree cement at oval tracks to the slimiest mud imaginable. We've been hit in the face with R/C cars with alarming regularity, dangled from helicopters, had our hands frozen to the camera and been involved in numerous other scenarios that challenge our collective journalistic spirit. Yet, we always return with the shot—undaunted! Ladies and gentlemen, Car Action's 10 best photos for '91!



R/C AT THE BRICKYARD

PHOTO BY STEVE POND

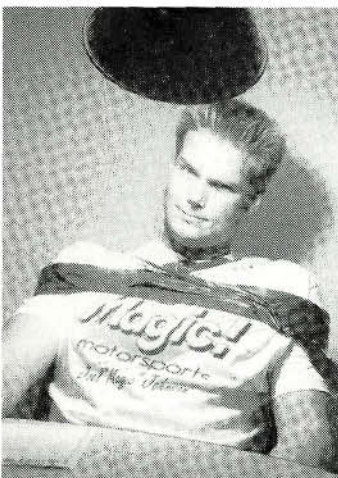
TrueSports Racing asked *Car Action* Editor Steve Pond to build them an R/C car based on the MAC Tools Indy car driven by world champ Geoff Brabham. Steve hooked up with TRC for the chassis and McAllister for the body, and he headed down to Indianapolis for one of the qualifying weekends. TrueSports laid out the red carpet for Steve. Great shots and interviews were had—this one with the pit crew. They all ran the R/C car and had a blast, including Geoff!



CRABIN' CLOD

PHOTO BY DEMETRIOS MATTES

Once again, the great resourcefulness and talent of our readers is manifest in Demetrios's Crabin' Clod and his photo. Modified to the max, his Clod Buster even has a working dump trailer, lights and a super-hot paint job to match. Featured in our "Home-Built Project" (January '91 issue), all the photos are his, including this imposing shot set against a majestic sunset.



INTERROGATION

PHOTO BY CHRIS CHIANELLI

When interviewing R/C car champ Joel "Magic" Johnson, Alleged Editor Chris Chianelli took along his trusty old Nikon to document the grand interrogation. Strapped to the chair and under the scrutiny of a bright lamp, the Magic Man 'fessed-up big time and even disclosed confidential information about his latest babe. Vee haf vays to make you talk!

GLAMOROUS GLASS

PHOTO BY JAY BOWMAN

Every summer, the town of Bloomington, IL, plays host to one of the largest gatherings of Corvette buffs in the country—the Bloomington Gold Corvette show! Corvettes of every imaginable year and color show up, but this year a troupe of 1/10-scale R/C cars converged on the sacred

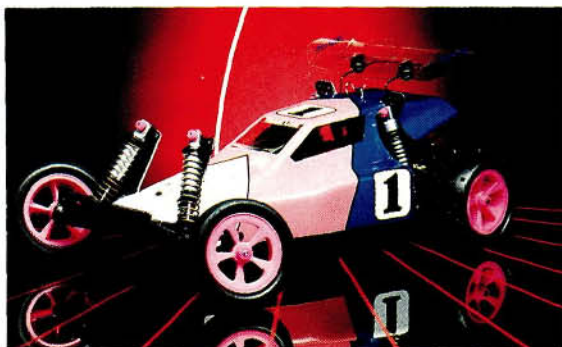
Bloomington grounds. Kyosho sponsored the festivities and offered many classes of R/C 'Vette racing, including the stock Kyosho versions. Spectators were amazed, and Jay Bowman was on hand to capture the spectacle!



ONE-HANDED!

PHOTO BY STEVE POND

With the June issue deadline approaching at an accelerated rate, we still didn't have that killer shot for our "Car of the Year" cover! At the eleventh hour, Steve hit the local beach with the Losi JR-X2 and a camera—alone, to get the goods. It's challenging enough to photograph these cars at speed, but think about shooting with one hand and driving with the other! Steve hurdled even this obstacle and came back with one of the most dramatic action shots we've ever seen.



HOME GROWN

PHOTO BY ROBERT BERGLUND

We always feature the neat, innovative projects of our readers in our "Readers' Rides" column. We love reader participation! Robert Berglund of Olympia, WA, hit us with the double whammy—his tricked-out JR-X2 and a trick studio photo. Check out that red glow. Way to go, Bob!



ROBOTRUCK

"Serve the public trust"

PHOTO BY YAMIL SUEO

The good folks at Orion Pictures were so excited when we informed them of our upcoming feature on an R/C RoboTruck built by *Car Action* reader David Semanik that they volunteered the services of the man himself—RoboCop! We set up the shot near an abandoned warehouse to simulate old Detroit, and the photos and the cover shot were featured in our October '90 issue. Any last words from RoboCop himself?—yes! "If someone shoots at you, explain that their attitude is unproductive."

HOT HEAD

PHOTO BY SCOTT BRANCH

A little too "hot" (ahem!) for publication of the article, we opted for a little "Inside Scoop" action to show the photographic expertise and seminal mind of Scott Branch and his controversial creation, a.k.a., the Hot Head. End of story.



JUGGLIN' ACT

PHOTO BY STEVE POND

R/C superspeedway action is fast-paced and exciting—just like full-scale racing. Pit-stop timing is critical, especially when changing battery packs and tires. Steve captures the moment at *Car Action's* Thunderdrome race that was held last fall. Cliff Lett (left) and a crew member juggle Kent Clausen's car during those critical seconds in the A-Main, which Kent eventually won!



WELCOME TO THE JUNGLE

PHOTO BY STEVE POND

At a local track, Steve captures the Schumacher Pro Cat in its tiger-skin regalia at full throttle during tests for a review in the May issue. Sharp focus at high speeds is difficult with small, elusive subjects like R/C cars.

accessories— low buck

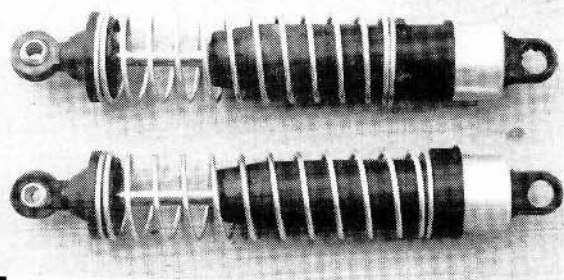
IN 1990, many new R/C products were introduced—so many that we couldn't pick just 10 of them! Here are 20 products that really impressed us. They've been divided into two categories: one for low-buck items that everyone can afford; the other for "high-zoot" items that relatively few can afford, but everyone wants.

We chose items that you can use on any car. Some of them will have a profound effect on your car's speed and handling. Others are simple, yet critical. These are the items that we think made the biggest splash in the ocean of R/C products. Check 'em out!



FUTABA MAGNUM SPORT RADIO AND 112B ESC

Futaba's newest, most affordable pistol-grip system is the perfect radio for R/C beginners. It has all the comfort and ease of pistol-grip radios, but none of the bells and whistles that make them expensive. To make installation easier, the unit has servo-reversing switches. The 112B electronic speed controller has variable throttle, so learning to drive is a breeze. Don't worry if you get stuck against a wall; the 112B also has reverse.

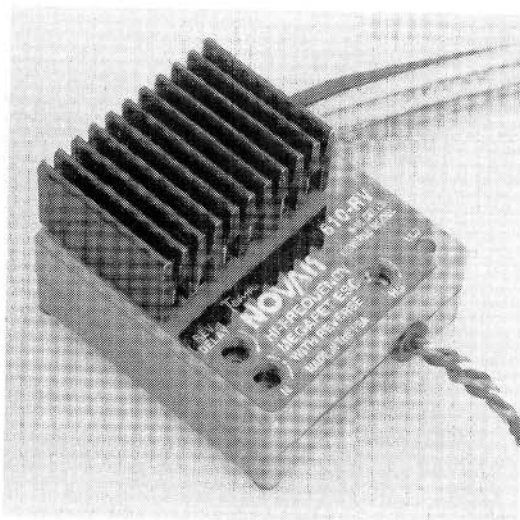


KYOSHO BLACK SHOCKS

Kyosho's new Ultima II has many interesting features, e.g., Black Shocks. Molded of Kelron (the material that's used for the Ultima II chassis), they're light and durable. Aluminum end caps add to their appearance and provide leak-proof seals. If you're looking for good, inexpensive, oil-filled shocks that really work, these are for you!

NOVAK 610RV

If you're looking for a speed controller with variable forward and reverse, the Novak 610RV is just the ticket. Like many of the new speed controllers, the 610RV has high-frequency switching to reduce arcing and increase low-end throttle response. Its time delay (from 0 to 4 seconds) can be set for reverse to prevent gear damage when you shift from forward. It handles up to 200 amps in forward, 100 amps in reverse, and it has a 100A braking capacity. The included Novak Input Plug System makes it compatible with all the major radios. The 610RV is perfect for monster-truck racers who want the extra feature of variable reverse.



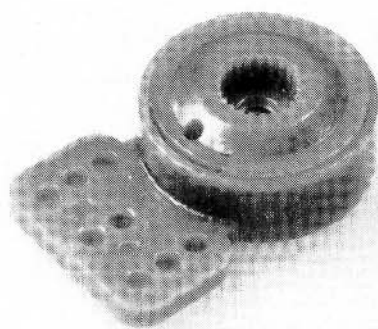
SANYO 1400mAh

A few years ago, Sanyo's 1700mAh SCE cells really made a mark on the R/C industry, and it looks as if the new 1400mAh SCR cells have done the same. They have all the gusto of 1200mAh SCRs but, with a 1400mAh rating, they can be used in modified-class racing. Also, because they're SCRs, they don't need a week's rest between races for maximum performance!



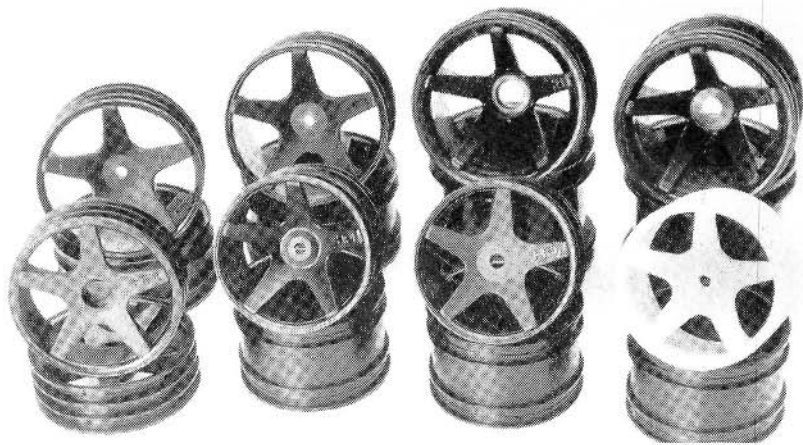
TECNACRAFT WING

It took a few years, but someone finally did it. Tecnacraft's new wing is extruded in a true airfoil shape, so it's very solid, yet light. Its shape provides more downforce than conventional flat wings, so a smaller Tecnacraft wing will produce the same results as a conventional one. It's available in either 5- or 7-inch lengths, so there's a size for any car. This company didn't just "wing it"; it did a lot of homework!



KIMBROUGH SERVO-SAVER

I know what you're thinking—that this isn't anything new; but where would we be without servo-savers?—probably knee-deep in broken servos! Kimbrough's easy-to-use servo-savers cost a buck or two, but they protect your car's vital servos from impacts that could destroy them. Kimbrough has a standard servo-saver (shown) and a heavy-duty version for special applications.

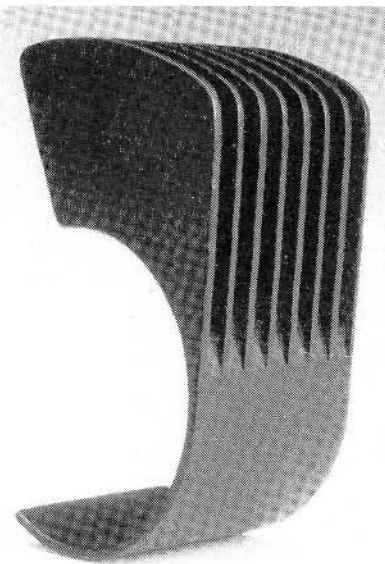


HPI WHEELS

There are hundreds of tires from which to choose, but finding the right set of rims is another story. HPI's universal rim sets are impressive. The Super Star wheels (shown) are available for trucks and buggies. Using the supplied adapters, they'll fit Losi, Associated, Tamiya, Traxxas and Kyosho cars and tires. They're available in chrome and gold as well as in white, black, yellow, green and pink.

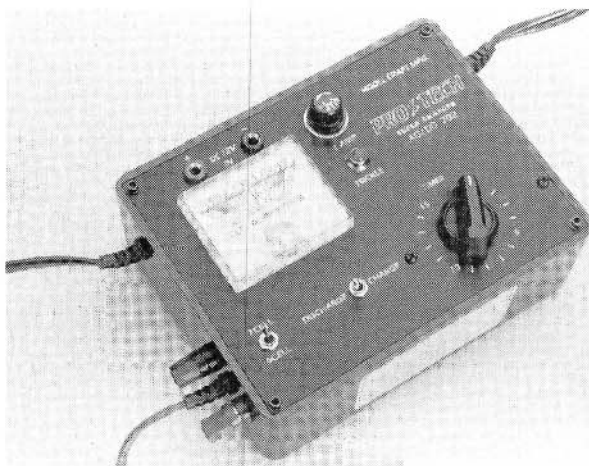
HOLESHOT SUPER COOLER 2000

It can be tough to keep those hot modified motors cool. Holeshot Racing Products has developed a heat sink that can be snapped directly onto any 540 motor to increase its cooling-surface area. Reducing motor heat increases run times and makes the brushes and magnets last longer. Weighing just over .50 ounce, it's definitely worth trying. A slightly smaller model (no.2001) is also available for the 10L, which has limited space.



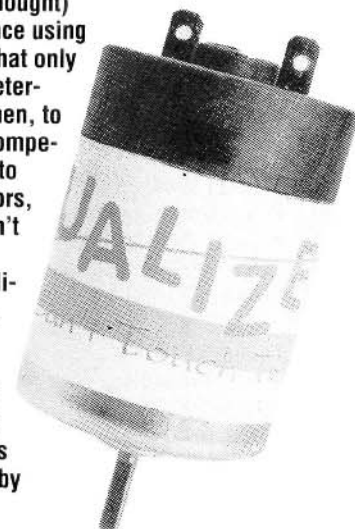
PROTECH 702 CHARGER

Choosing your first charger can be difficult, but the ProTech 702 has every feature a beginner needs. Powered by either a 12V source (cigarette lighter or car battery) or a 110V AC source, it charges six or seven cells and discharges them after they've been run. A mechanical timer keeps track of the charging time and shuts the charger off after 15 minutes. A large analog meter tells you how many amps are flowing through the battery pack in both the charge and discharge modes. All this, and it's affordable, too!

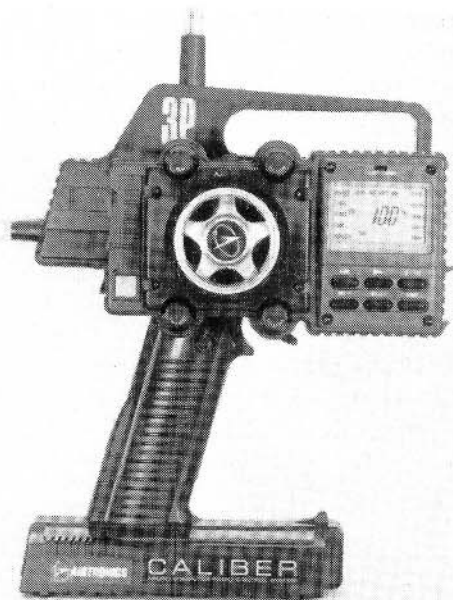


TRINITY EQUALIZER

When stock racing started, the idea was (or so we thought) that all cars would race using identical motors so that only driving skill would determine the winners. Then, to get an edge on the competition, people began to tinker with their motors, and soon, there wasn't much difference between stock and modified lap times. Well, Trinity has made a tamper-proof motor that will put equality back into stock-class racing. Ideas like this keep the R/C car hobby alive!



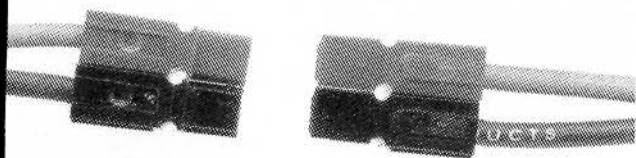
accessories— high end



AIRTRONICS CALIBER 3P

The 3P is the latest "Star Wars" guidance system for R/C cars and boats. Hailed as the first fully computer-programmable radio, it's a high-resolution FM system that's available on 27 and 75MHz. Its more outstanding features include programming capability for up to three models (settings can be stored in the transmitter's memory). The transmitter also has a reversible handle and optional, rubber grip pads for comfortable right- or left-hand operation.

Looking like a fighter-plane's cockpit and with features to match, this is sure to be a very potent weapon at the track!

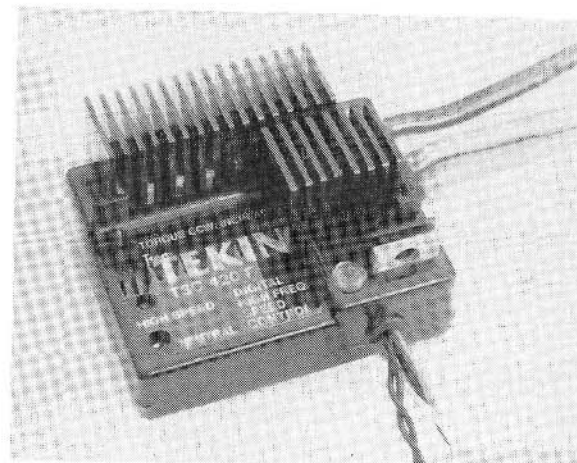


SUPER CONNECTORS

A chain is only as strong as its weakest link, right? Well, don't make your connectors the weakest link in your electrical system. In our recent "Connector Inspector" article, these connectors ranked as top banana. Available from Litespeed and Sermos, these silver-plated connectors offer a lower resistance than any we've tested. They're color-coded, so you won't reverse your connections unless you're color blind! They don't come in male/female pairs (let's just say they're "neuter"), so they're much more cost-effective than some connectors. Why? You can use them on your speed controller, motor, or batteries and not be left with a pile of unmatched connectors. They aren't new this year, but they made it onto all the *Car Action* editors' lists.

TEKIN 420

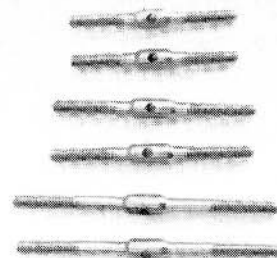
Tekin's new 420 electronic speed controller is the latest in its line of high-frequency SCs, and it's the best! Similar in size to the popular Tekin 700, the 420 features a voltage drop of only .018 volt compared with .025 volt for the 411P. The 420 can handle from 4 to 20 cells, and this makes it suitable for boats and pulling, too. Of the 11 FETs installed in the 420, eight are for forward, two handle the braking and one regulates BEC voltage. But the feature that makes the 420 really great has nothing to do with performance. Like all new Tekin speed controllers, the 420 has fuse protection against reverse polarity. If the speed controller is accidentally connected backward, a fuse in the outer case will blow, and this will preserve the sensitive electronics inside. When that happens, simply remove the fuse, replace it with a new one, and you're back on the track. There's no need to send the controller back to be repaired. Need we say more?!



TECNACRAFT TITANIUM LINKAGE

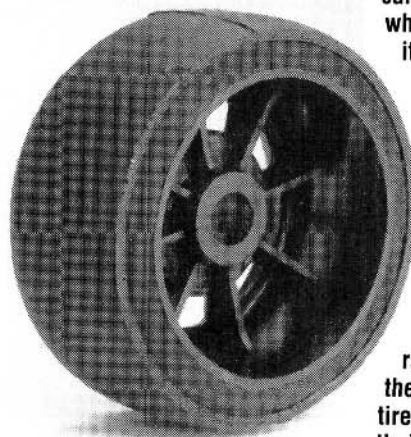
When you're trying to adjust your car's linkage, you want to make the job as easy as possible. If you use a simple threaded rod for linkage, you have to remove one end to adjust the length. Tecnicraft simplifies this with its Ti-Rod linkage kits. Not only are these

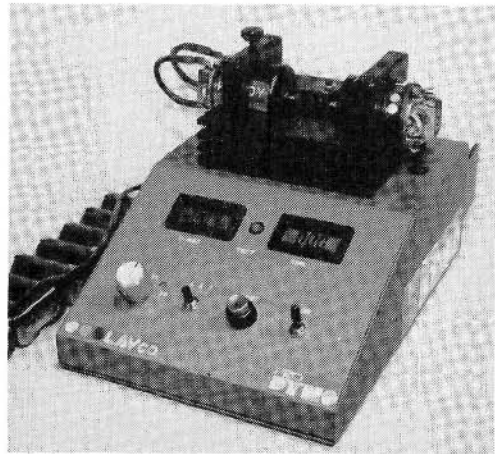
links light, but they're also very easy to adjust. One end of the rod is threaded in the usual 4-40 way, and the other is threaded reverse 4-40. To lengthen or shorten the link, just insert a small Allen key through the center of the rod and turn it. Ti-Rods are available for all popular cars and in custom-length pairs, too.



TRC COMPOSITE RADIALS

The introduction of radial tires revolutionized oval racing, but the ever-increasing speed of our cars meant we needed a better wheel—enter, TRC's Composites. The composite black material used for these wheels is significantly stiffer than the white plastic found in many others. This leads to a significant reduction in flexing under stress, and the result is more consistent handling and a virtual elimination of breakage. These wheels have TRC radial or foam tires, and they're also available without tires for those who like to make their own.





LAVCO PRO DYNO

Most of our R/C racing accessories have ratings that indicate how they're likely to perform, but motors aren't rated, so it's difficult to predict their performance—at least, it was, until *now*! LAVco, the company responsible for bringing us the first battery-matching system, now offers the incredible Pro Dyno.

This ultra-sensitive dyno can detect changes in the condition of

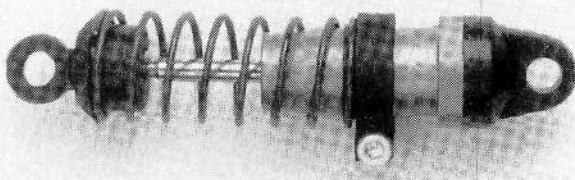
your commutator and assess the effect of timing changes, changes in brush compounds or any other changes made to enhance performance.

Motors can be tested at 10, 15, 20, 25 and 30 amps and at simulated voltage levels of 4, 6 and 7 cells—Mosfet regulated for precise results every time. There's a total of 15 test settings for a variety of applications! All this doesn't come cheap, but there's a "Sport" version on the way, and its price will be half that of the Pro Dyno!

ASSOCIATED TEAM SHOCKS

Some of the most significant improvements on the new RC10 team car are its new, hard-anodized shocks. This

isn't just another "color anodizing"; the aluminum is "penetrated" by this type of treatment, which greatly increases its hardness. The finish won't wear off and ruin shock action. If you already have a well-used set of the original Gold shocks, you know that the piston wears the inside coating, and that this, in turn, fouls the oil. These shocks were designed to last!



CAR ACTION SC-800 CHRONOMETER

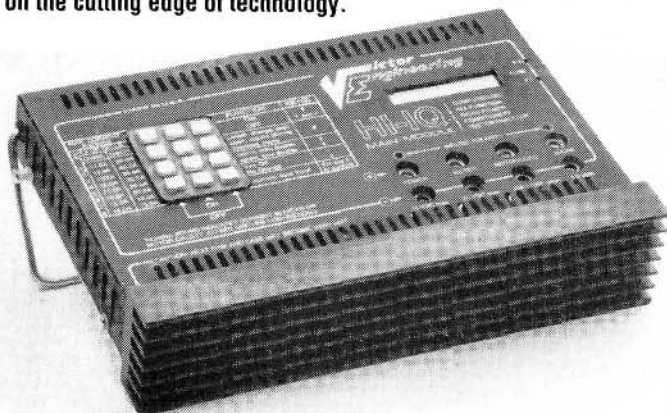
We don't usually pick products from our own, *Car Action*, line but, in this case, we made an exception. The SC-800 has proven to be useful while racing and testing: if we hadn't had several for the Truck Shootout, the operation would have been a *mess*! At Thunderdrome, we used the speed setting during the Insane Speed Run, and we had accurate readings before the announcer told the crowd the results.

The SC-800 features a 50-lap memory that can re-count the number of laps and the individual laps times of any car. In other modes, the SC-800 can determine speed, average lap times, and fastest lap. There's also a count-down timer with which you can time yourself while making practice runs, or calculate the time remaining before your heat. Numerous other features make the SC-800 an essential part of the winning combination. If you race a lot, you should have an SC-800.



VICTOR HI-IQ

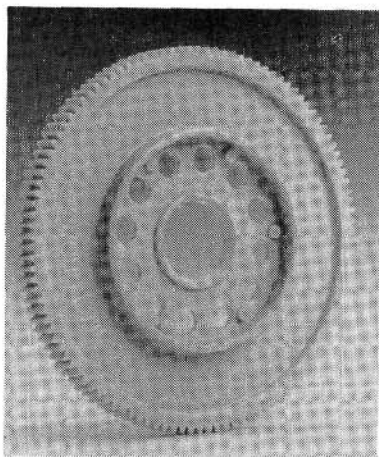
Without doubt, the Victor Engineering HI-IQ Sr. is the most advanced Ni-Cd battery-charging system. It has: Ni-Cd conditioning functions that include peak-charging (up to 15 amps); discharging (up to 20 amps); cell cycling; cell grading and matching; timed charge mode and trickle-charging. As well as the basic charging functions, it includes a digital voltmeter, a battery tester and a motor-current tester. As if this weren't enough, the Sr. also has a slew of options to cope with the charging and testing of almost every type of R/C electronics. Victor Engineering is also constantly offering updates to keep their chargers on the cutting edge of technology.



MAGIC MOTORSPORTS SPUR GEAR

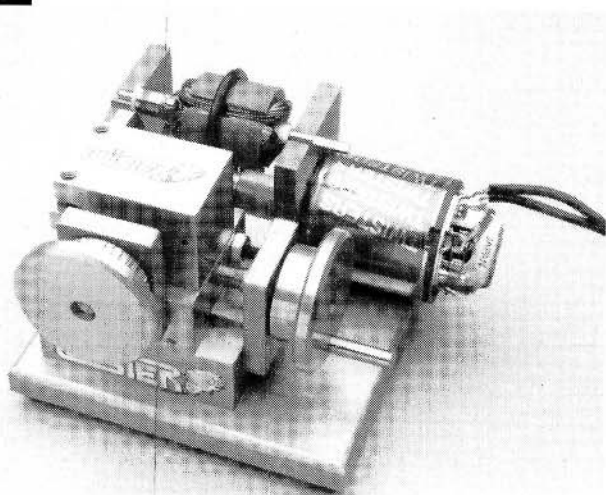
The diffs on on-road cars are constantly dirty because they're totally exposed. After only a few runs, dirt will make even the

smoothest diff feel "crunchy." Now Magic Motorsports offers a spur gear with protective shields to keep lubricant in and dirt out. This shield also holds the diff rings in place, so the spur can be removed with the rings and balls intact and replaced with a pre-assembled unit. The gears are available in either 48-pitch yellow or 64-pitch pink, so it's easy to identify them.



tools

As the editors of *R/C Car Action*, we try lots of tools related to the hobby—including the very newest stuff! Here are the 10 items that have helped us most with our projects during the past year. We aren't suggesting that you rush out and buy all these "trick" tools, but they do deserve a closer look.

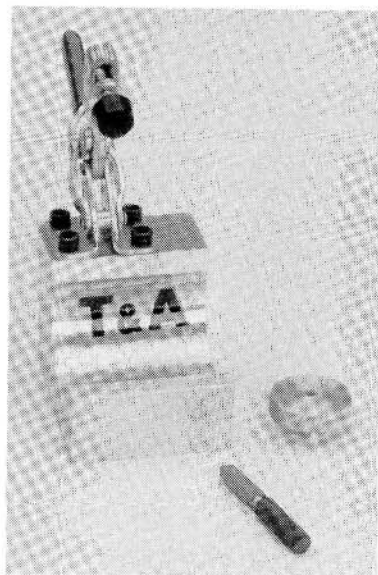


TWISTER MINI LATHE

Probably the most important ingredient of a fast motor is a clean, true commutator. Until now, the only way to achieve this with an *old* motor is to have it rebuilt by a motor manufacturer. Now, with this portable Twister Mini Lathe, you can cut your commutator at the track in a couple of minutes. It can cut an armature to an incredible tolerance of .00005 inch, which is better than most full-size lathes can do. Although this unit isn't for everybody, clubs, hobby shops and teams will definitely get a lot of use out of this little gem.

WIHA TOOLS

It's no secret that a good set of tools makes any job easier. Well, these just may be the tools! From a simple screwdriver to a metric nut driver, Wiha has the correct tool for every job, and all have a jewelers'-style pivoting end for easy single-handed operation. They're available in standard and metric measurements, and in a wide variety of sizes. Torque wrenches and T-handles are also available. The wrenches are sold in complete sets or individually, so you can choose exactly the ones you need. Wiha tools are definitely worth checking out!

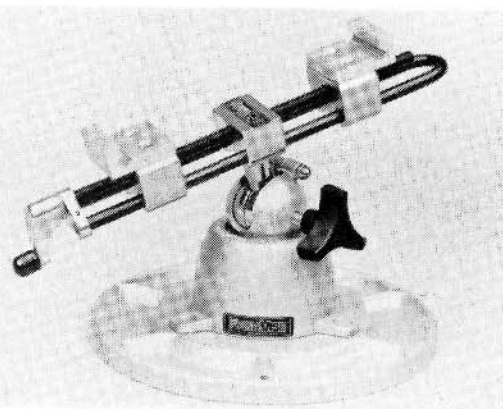
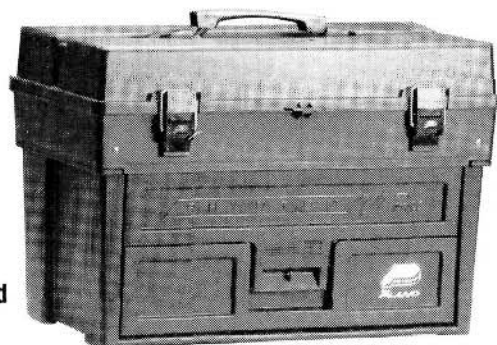


T&A MOTOR BUDDY TEST BLOCK

When you're soldering capacitors to your motor, you don't want to have to fight to keep it in one place. T&A has come to the rescue with a motor vise—a solid little tool with which you can clamp your motor while you solder leads or polish the commutator. Machined out of solid aluminium, it also makes a great stand for motor testing, because it will hold any motor securely and, at the same time, draw heat from it. The photo also shows a knurled wheel, which, when attached to a motor shaft, makes polishing with a commutator stick easier.

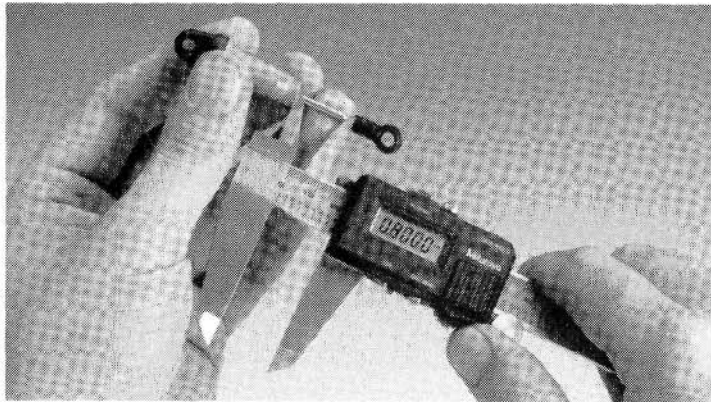
PLANO PIT BOX

Carrying your ever-increasing collection of R/C car goodies to the track can be a real chore; and when you get there, it's difficult to keep track of them. Plano now offers a solution: the PT-797 was originally designed as a fishing-tackle box, but it's much larger and has lots of compartments that are suitable for small parts. It has four drawers for tools and small items and a huge top compartment for chargers, batteries, radios and other bigger items. If you want a convenient way to carry your gear to the track, this may be just the ticket. Be warned!—this box holds so much stuff that it gets pretty heavy.



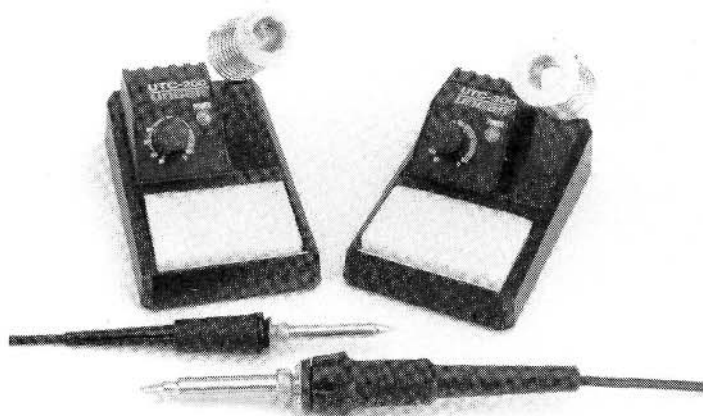
PANAVISE CAR STAND

Your pit table can get very messy in the heat of racing. The last thing you want is to snag your car on your soldering-iron cord and send it flying to the ground. The PanaVise car stand will help you to avoid this. Its adjustable jaw will accommodate a chassis of just about any size, and it enables you to swivel it 360 degrees as well as forward and backward. Six parts holders around its base provide lots of room for those small parts that always get lost. Made of steel and aluminum, it's a strong, solid base that won't shift or wobble while you're getting ready for the next heat. It's definitely a better way to get the job done.



MITUTOYO DIGITAL CALIPERS

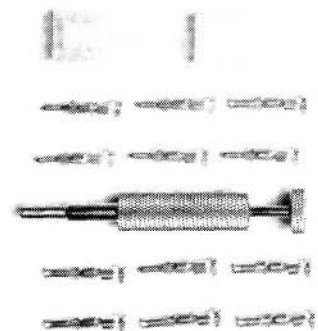
When you're building an R/C car, accurate measurement is often vital, e.g., when you want to ensure that two linkages are exactly the same length. You won't know just by looking, and that's where the Mitutoyo caliper comes in. Its LCD display will display either metric or standard measurements up to 8 inches in increments of .0005 of an inch, or $1/100$ mm. Like other calipers, it will measure inside and outside diameter, depth and length and, for the people out there with a CAD system, it has a port with which it can be connected to a computer.



AEROTREND PIN PUSHER

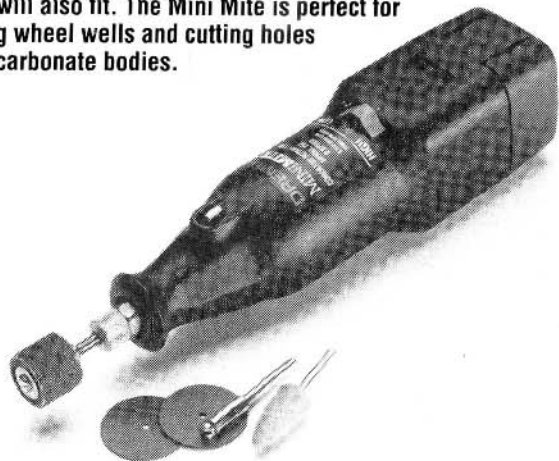
If you've ever tried to take the pins out of a Tamiya connector or a similar one, you know it isn't easy, but Aerotrend now offers this useful little tool just for that purpose. Just slide the tool's tip over the pin to compress the locking device; push the Pusher's plunger and voilà!—the pin is removed without being damaged.

Aerotrend also offers the Pin Pusher Plus, which includes a set of six replacement gold-plated pins.



DREMEL MINI MITE

Dremel has long been known for its superb mini power tools and attachments. The Dremel Mini Mite is perfect for trackside cutting, grinding, or polishing, wherever there's no AC power. It's powered by four AA Ni-Cd cells that can be recharged in three hours with the included charger. The unit comes with five attachments, and all the other Dremel attachments will also fit. The Mini Mite is perfect for shaping wheel wells and cutting holes in polycarbonate bodies.



UNGAR RACE STATION

Whether you're a serious racer or not, a soldering iron is always handy because it has so many uses, from building battery packs to installing a new motor. It's important to have an iron that can deliver the power when you need it—enter the Ungar Race Station. This enables you to work on fine electronic components at a low temperature of 400 degrees, or heavy-duty jobs at temperatures up to 800 degrees! The base unit controls the temperature setting and has a sponge that's used to clean the iron's tip before and after use. Whether you're a beginner or a pro, a good soldering iron is a must.



STEVE POND'S TOOLBOX

Who wouldn't want this? He's the editor of the world's premier R/C car magazine, so you can bet your bottom dollar that Steve Pond's toolbox is filled to the gills with all the hottest goodies on the market. Let's take a look, shall we? There's an Ungar Race Station, a 1-pound roll of solder, a Twister Mini Lathe, a Revtech line charger, a Mitutoyo 8-inch digital caliper, a Hewlett-Packard 15C calculator, MCS bearing cleaner, a full set of pinions (32-, 48- and 64-pitch), Wiha tools (all of them!), tie-wraps, servo tape, an RPM parts tray, diff lube (every imaginable kind), X-Acto knives, CA glue (thick, thin—you name it) and more—if you dare to look deeper into the box's dark recesses!

drivers

Our choices for Car Action's Top 10 Drivers were made according to some very simple criteria. We asked one question: how consistently has the racer held up and scored—heat after heat; race after race—while having the inevitable, unforeseen logistical and technical problems thrown at him at the worst possible times? Our hats are off to the winners, and we wish them good luck in all their races. (Please note: the racers are not listed by merit.)



JOEL JOHNSON

The "Magic Man" got his first big break at the '81 Nationals at Ratty Raceway, where he won the 4- and 6-Cell Stock Classes. His national titles are too numerous to list here, but his most recent accomplishments include winning the '87 IFMAR 1/10-Scale 2WD Modified World Championship and TQ'ing at the ROAR 1/10-Scale 2WD Modified Dirt Oval Nationals and 1/10-Scale Paved Oval Nationals.

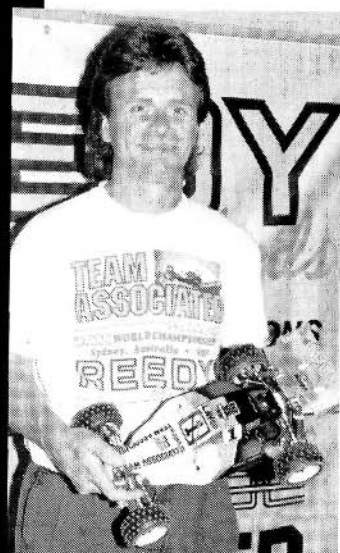
Joel is a student at San Jose State and is employed by Trinity Products as a professional driver and product developer for the Magic Motorsports product line. In addition to Trinity, he's sponsored by TRC and CompositeCraft.

GIL LOSI JR.

Gil has been racing for 11 years. He started at the original "Ranch" in Colton, CA (now the Ranch Pit Shop in Pomona, CA), and he has won the SCORE World Champs (Modified) three times. He won the first IFMAR World Champs (4WD). Gil has raced 1/8- and 1/12-scale successfully, including TQ'ing at the '87 1/8-Scale World



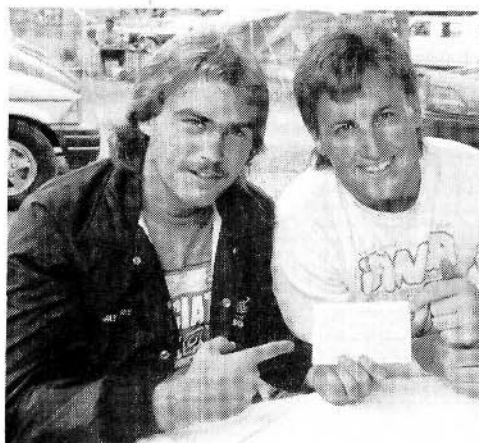
Champs. As the head of R&D at Team Losi, Gil has been instrumental in the development of the Associated RC12L and RC10, the Team Losi JR-X2, JRX-Pro, JRX-T, Junior Two and Junior T, as well as the "Naturals" tires and other Losi products. Gil is also sponsored by Revolution Motors, Prime Time Batteries, True-Pitch Gears, Airtronics and Novak.



CLIFF LETT

Cliff started his racing career as the chief mechanic and test pilot for the Factory Yamaha motorcycle team. He then went to work for Team Associated as head of its R&D department. In 1989, Cliff won the Reedy International Race of Champions in California and in Austria, and again in 1990 in California. At the '89 IFMAR 1/10-Scale Off-Road World Championships in Australia, he placed 3rd in 2WD and 4th in 4WD. In 1/10-Scale oval racing, he won the '89 TRC/Trinity Challenge at Lake Whippoorwill and, in 1990, he won the Insane Speed Run at the R/C Car Action Thunderdrome Race with his RC10Ls. Cliff is sponsored by Associated, Yokomo, Reedy, Airtronics, Novak and RCRC.

Jay (left) has won more than 400 races, including the first ROAR Nationals (both Stock and Modified classes), the first IFMAR World Champs and the '89 NORRCA Nats. A four-time NORRCA National Champion, Jay is also the only driver in the world to make all six IFMAR World Championship A-Main finals. He has raced for Associated for seven years, and he was with the company during the development of the RC10. Jay has had opportunities to work on or develop equipment for such movies as *Dead Pool*, *Ghost Busters II* and *Tango & Cash*, as well as numerous TV commercials.



JAY HALSEY

TONY NEGRI



Tony started his successful career by winning the ROAR 1/12-Scale Nationals, and then he won the IFMAR 1/12-Scale World Championships in Denmark in '84 and again in Las Vegas in '86. One of the most versatile drivers in the world, Tony took 3rd place at the '85 IFMAR 1/10 Off-Road World Championship in Del Mar, CA, and another 3rd place at the '87 IFMAR 1/8-Scale Gas World Championship in Pomona, CA. His other accomplishments are too numerous to list here. He's sponsored by Associated, Reedy, Paris and Airtronics.



In 1983, Chris started 1/12-scale racing and soon became a team driver for several companies. In '88 and '89, he TQ'd at the U.S. Indoor Championships. His National Championship wins include the ROAR 1/10-Scale Stock Oval and the 1/12-Scale Modified Winternats, which he has won twice. In 1990, he TQ'd at the 4-Cell Nationals, and he TQ'd and won the IFMAR Winter Champs Warm-Up Race and the IFMAR 1/12-Scale Modified World Champs. Formerly sponsored by Trinity, Chris now races for Cam Motors and Associated Electrics.

Masami became world famous by winning the 4WD Class at the '87 IFMAR 1/10-Scale Off-Road World Championships in England, where he drove a Schumacher. He was an unsponsored driver at the time, but Yokomo later asked him to join their team.

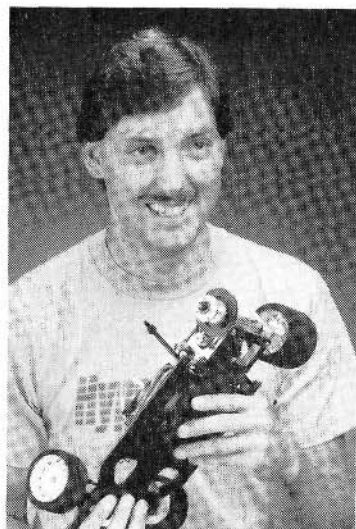
In 1988, Masami won the 1/12-Scale IFMAR World Championships with an Associated 12L. At the '89 IFMAR Worlds in Australia, he took the 2WD Class with an Associated RC10 and the 4WD Class with a Yokomo. He holds four IFMAR World titles—twice as many as any other driver. In 1991, he won the 2WD and 4WD Classes at the prestigious Reedy/Sanyo International Race of Champions in Southern California with his RC10 and Yokomo cars. Masami is sponsored by Yokomo, Associated, Reedy and KO.



M A S A M I H I R O S A K A

K E N T C L A U S E N

Kent started driving 1/12-scale electric cars for Team Associated, and he and Mike Lavacot were the guys to beat. He won the '79 ROAR 4-Cell Stock Nationals in Ohio. As for oval racing, he won the '87 and '89 Whippoorwill 1/12-Scale Oval Race (using an RC12L both times) and the '89 6-Cell 1/12-Scale ROAR Oval Nationals in Georgia. In '89, Kent also won the ROAR 6-Cell On-Road Nationals in Arizona, and he set an Insane Speed Run record of more than 70mph with his RC10L at the Thunderdrome. He won the '90 Thunderdrome Enduro. Kent works for and is co-sponsored by LavCo. His other sponsors are Associated, Reedy, Novak and Futaba.



Ralph started racing 1/12-scale electric cars for Team JOMAC in the Dallas, TX, area. He won more than 200 club trophies and also became the ROAR 1/12-Scale National Champion. Ralph then began to race 1/8-scale gas cars with Team Associated, and he has now won more ROAR National titles than anyone. He has been the Top Qualifier at numerous World Championships and has won many McCoy and Florida Winternats. Ralph is number one in 1/8-scale gas car racing!

Last year, with his RC12L, Ralph finished in 3rd place at the 1/12-Scale World Championships in Singapore. While working for WCM, he won numerous 1/4-scale races. Currently, Ralph works for Hyperdrive, and he has won many on-road and oval races with his Hyperdrive cars. He's also sponsored by Cam Motors, Associated and Futaba.

R A L P H B U R C H J R

Rick has been racing since 1982, and he started Peak Performance Racing Motors in 1986. He was the '90 ROAR National Champion in 1/12-Scale 4-Cell, 1/12-Scale On-Road and 1/10-Scale On-Road. As if this weren't enough, he TQ'd and won *both* the 2WD and 4WD Modifieds at the Reedy International French Grand Prix in Lyon, France.

In addition to Peak Performance, Rick is sponsored by Futaba, Tekin, Associated Electrics and Kyosho.



Pit tips

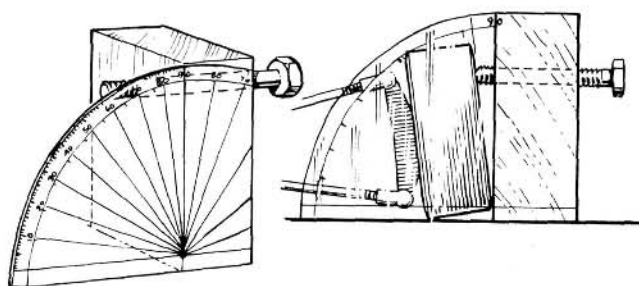
Jim Newman's "Pit Tips" is one of the most informative sections in *Radio Control Car Action*. Readers submit their ideas, and Jim brings them to life—tool tricks, helpful hints—you name it! Some will make your car run longer or more reliably; others will help you to organize your workshop or to save a few bucks. Read on, and find out the top "Pit Tips" of 1991!



SOLVENT-BATH PARTS HOLDER

Stainless-steel-mesh tea holders—the kind with a good latch and chain—are ideal for holding small parts, such as bearings. Suspended in a closed container of solvent, they allow dirt to fall to the bottom while keeping the parts clean.

Sean Johnson, Merriam, KS



CAMBER GAUGE

Drill a hole through a suitable block of wood, and then screw a large machine screw through it. Cut a protractor as shown, and glue it to the side of the block. Now, you can set the camber on one side of your car, read the angle, and then set the wheel on the opposite side to the same number of degrees! Be careful when you tighten the machine screw: it should only just touch the tire.

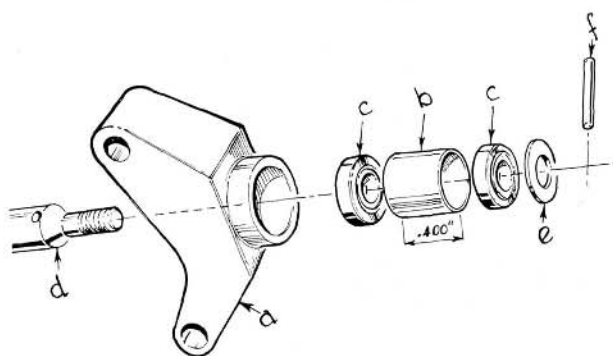
Stanley Chan, Braddell Hill, Singapore



DYE STRAINER & STORAGE

Cut a 2-liter soda bottle as shown, then drill small holes in the cap. Put the cap back onto the bottle, which you'll find fits perfectly into the top of an empty milk jug. After dyeing plastic parts, carefully pour the dye into the "funnel," from which the parts can be easily retrieved. The dye can be stored in the jug for future use. No muss; no fuss!

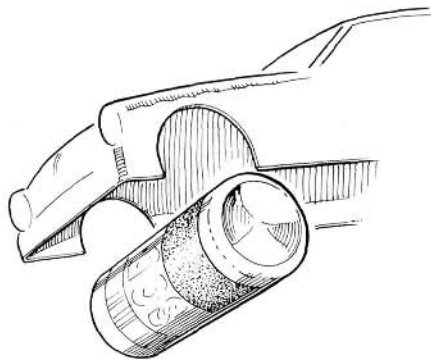
Larry Jumper, Colby, KS



RC10 AXLES FOR THE RAIDER

The selection of wheels and tires for the Raider is limited, but with RC10 axles, you can use a variety of RC10 equipment. Bore-out the Raider hub carriers (a) to accept a $\frac{3}{8}$ -inch-diameter brass tube (b); press the tube in until it's flush, and secure it with CA. Press in the two replacement $\frac{1}{4} \times \frac{3}{8}$ -inch RC10 bearings (c), and add the RC10 axles (d), the thrust washer (e) and the drive pin (f). It's easy to bore-out the carriers with a hand drill if you use increasingly larger drill bits (in $\frac{1}{64}$ -inch increments).

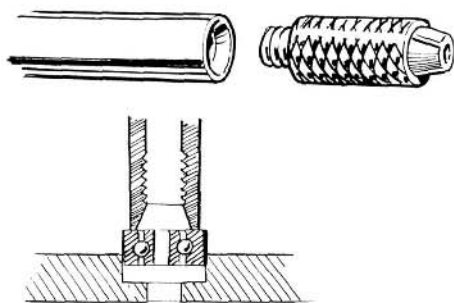
Dennis W. Bloss, Clio, MI



WHEEL-WELL SHAPER

You don't have to trim wheel wells with clippers and a knife! Wrap sandpaper around a soda can; it's the right diameter, and it will give you a beautiful finish.

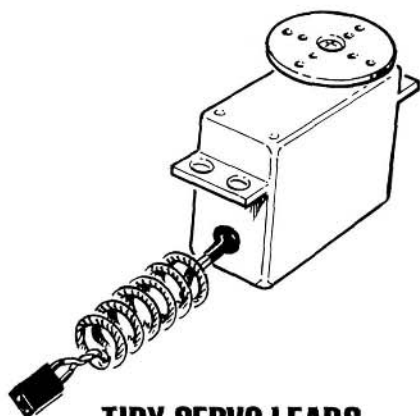
Brian Hill, Andover, MA



BEARING PRESS

Bearings can be stressed if you press on their inner race when you insert them, so here's a better way to do it. Remove the collet from a no. 2 X-Acto knife, and you'll find that the handle is exactly the right diameter to fit nicely on the bearing's *ouerrace*. Now you can press in new bearings squarely without damaging the fragile balls.

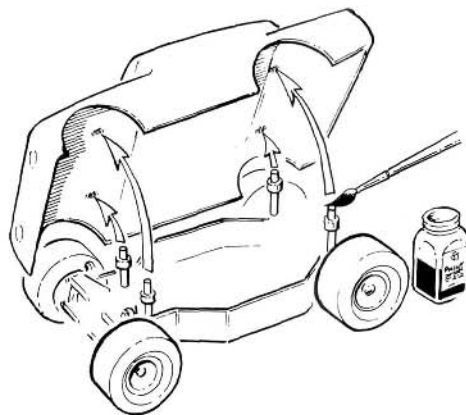
Charles Jacob, Rocky Ford, CO



TIDY SERVO LEADS

Are you irritated by the long servo leads that sprawl across your car? Wrap each one tightly around a dowel (or a piece of music wire) of the suitable size. When you remove the dowel, each lead will be left neatly coiled. Now, the inside of your car will look organized!

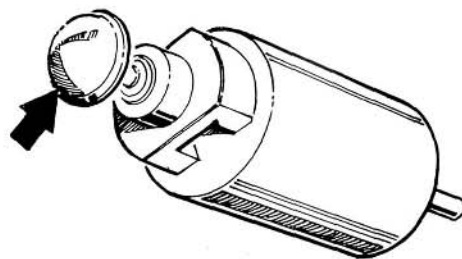
Jamie Fong, Calhoun, GA



BODY-MOUNT MARKING

Before you drill mounting-post holes in a brand-new, painted, polycarbonate body, you'd better be certain of their positions! Put paint on the top of each post; while it's still wet, carefully set the body into place. When you remove it, you'll find four dabs of paint marking the spots where you should drill.

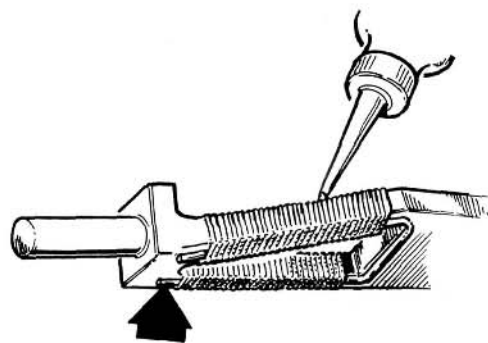
Jeff Koons, Carbon, IN



MOTOR-BEARING DIRT SEAL

The rubber shock gasket that fits over Tamiya's yellow shock units also snaps over the endbell bearing to keep dirt out and oil in. This simplifies maintenance and prolongs bearing life. Don't use the gasket as an oil reservoir; too much oil passing through it will contaminate the commutator and damage your motor.

Collin Lockhart, Rochester Hills, MI



A-ARM REINFORCEMENT

Here's a unique way to reinforce A-arms so that they won't break during a race. Bend a piece of $1/16$ -inch music wire (arrowed), and glue it to the bottom of the A-arm with CA. To hold the wire on the arm, wrap thin cord around it and saturate it with CA. (Remember: whenever you use a lot of CA, do it outside, so that the fumes disperse quickly.)

Stephen S. Warner, Spokane, WA

readers' rides

We're constantly amazed by our readers' ingenuity, and we look forward to digging each new batch of "Readers' Rides" out of the mail. We've received pictures of almost every car on the market, in every configuration possible! Here's the cream of the crop—the year's top 10 "Readers' Rides."



ONE COOL CAT

The elusive Jimmy Joe, who hails from Mount Maunsnui, New Zealand, sent us this quick pic of his current ride—a Schumacher Pro Cat. He laid on a really cool paint job and then set out to make it run—not

well, but *great*! A Novak T-1X, a Twister motor and a Wasp short belt help this car live up to Jimmy's high expectations. This Cat makes heads turn and tires burn!

BURNIN' DOWN THE CLOD

We receive pictures of Clod Busters every day, but Paul Trevino's (of Cheyenne, WY) is one of the nicest! There are so many hop-ups that it would take a whole page to list them. Many hours of hard work and lots of home-made parts went into this brutal beast. Designed for pulling, this Clod weighs an incredible 27 pounds, and it's definitely one mean machine!



OO, FAHRVERGNÜGEN!

Out of the mind of Stefan Reichmann (of Weissenhorn, West Germany) and onto the pages of *Car Action* comes this wild-looking Volkswagen Golf GTI 16V. We don't know much about the car, but it's based on a Robbe kit and Stefan used spare parts to complete it. Its surprisingly scale look stands out. This GTI is sure to excite you!



ONE HOT ROD!

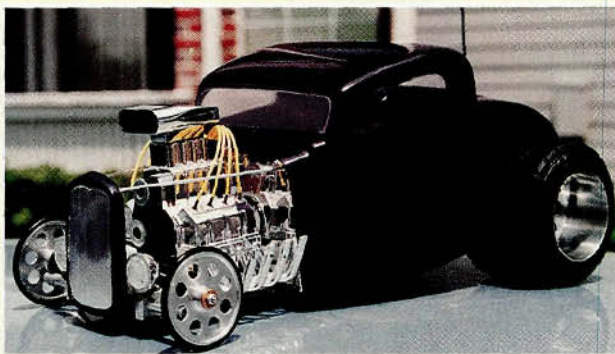
This incredible street rod is the work of Jay Heiser of Bel Air, MD. Its chassis is an Advanced Custom Street Machine, topped by a '34 sedan body—Jay's first attempt at airbrushing, and a fine beginning! With gold pinstriping, a candy-blue body and other small details (e.g., the rear-view mirror and hood scoop), this rod is ready to take on any concours competitors!

CUSTOM WORKS TRAILER

This concours contender comes to us from Tom McAdam of Pensacola, FL. The Custom Works Dominator is armed with a new Rocket Wedge body and a Phoenix 314 motor. A modified trailer, which is based on Jim Shepka's "Low-Dollar Custom Trailer" article, tows this slick car around, and a JR-X2 with an Andy's Jeep Comanche body is in the works to help pull this wild ride. We were so impressed with Tom's creation that we did a feature article on it in our November '90 issue.

OLD FORDS NEVER DIE!

Hot rods are back with a vengeance and no one is happier than Steve Young of San Antonio, TX! Using an Advanced Engineering chassis as the base, Steve added a set of tires, and Advanced milled-aluminum rims, a Trinity Sprint motor and a McAllister '34 Ford Coupe body. Then came the customizing: a narrowed rear end, dropped front end (for the weed-eater look), a detailed and chromed engine and firewall, a custom-carved front grill and chrome grill-support rods. Steve's final touch was the license plate, "NVMY34" ("envy my '34"). I'm sure that everyone who sees this car is green with envy!



SLICK SPRINTER

Bob Mercier is a new kid on the block, and he has a lean-and-mean driving machine! Bob added a set of Andy's A-arms, a Novak T-1X, Custom Scale Universals, and a McAllister lowering kit to the basic RC10/Big Boys Toys conversion kit. Special thanks go to Hal Empey, who was instrumental in creating this beautiful car!

THE HIGHEST FORM OF FLATTERY

Kevin Brister (of San Diego, CA) modeled his custom-built, 1/10-scale road car after one of the perennial favorites in IMSA GTP racing—Jan Lammers' Castrol-sponsored Jaguar XJR-9. Based loosely on an Agitator 2.0, Kevin's car is equipped with a Corally ESC and a Quarterflash Motor—a potent combo that has helped him win "quite a few" A-Mains!



IVAN THE TERRIBLE

Jay Hollingsworth, of Alexandria, PA, owns this incredible RC10/Toyota Stadium Racer. The many mods on this truck include a custom rear shock mount, rear body mount, lightened chassis and dual front shock mounts; aftermarket parts could make it even more unusual! Its incredible quality would make even Ivan "Ironman" Stewart proud.



CLOD BRUISER

With the idea that "bad is better," David Salazar of North Bergen, NJ, set out to be the "baddest" in the land. Starting with a ho-hum Clod Buster as a base, David added parts until he had two Clod Busters (a modified one and a stock one built out of the leftover parts!). He replaced the stock chassis with one from ESP and added just about every "hi-po" goodie that ESP makes! The electronics are a combo of a Tekin 700 and a Tekin Reverse module controlled by a Futaba PCM. The potent chassis is topped off by a Tamiya Bruiser body, and the crowning touch is the blown Keith Black Hemi that sits in the middle of the hood. Watch out! The blower belt actually turns (it's powered by a small motor under the oil pan). This is definitely one of the baddest trucks around!



TRACK REPORT



WITH THE introduction of the Junior Two, Team Losi* has once again set the standard in off-road racing—this time in the out-of-the-box, entry-level class.

From its sleek, new, plastic-composite chassis to its



junior two

T E A M L O S I

proven transmission design, the Junior Two raises the level of available, out-of-the-box performance. It incorporates many of the standard features that made its predecessors (the JR-X2 and the JRX-Pro) so successful, including computer-designed shocks and

suspension, and a world-class transmission.

The Junior Two is an excellent investment because it has many high-performance features that aren't found in other entry-level, off-road cars. Do you want to find out what comes with the car

that's sure to be this summer's "winningest" 2WD off-roader?—read on!

GETTING READY

To get started, you'll need a set of basic tools, including screwdrivers and needle-nose pliers. Although Team Losi

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all-time low
—PRICE!**

PHOTOS BY YAMIL SUEB



junior two

supplies the necessary Allen wrenches, I recommend that you pick up some Allen screwdrivers. (Bondhus Tools* makes a nice set for about \$20.) The kit's injection-molded plastic parts pose tough challenges for a builder's fingers, and you might strip the socket-head screws if you use the supplied wrenches. Although optional, nut drivers are highly recommended, and you'll also need $\frac{3}{16}$ -, $\frac{1}{4}$ - and $\frac{3}{8}$ -inch drivers.

To help you determine the proper ride heights and the lengths of the camber links and tie rods, a plastic set-up tool is provided. This is a welcome surprise; most of the kits I've built provide only two-dimensional diagrammatic representations. Finally, be sure to have some Loctite* handy, because you must secure each assembly.

You'll also need a high-performance radio, a motor, a servo-saver and an electronic speed controller. (The kit doesn't



include a manual SC.) I chose a Futaba* Magnum Jr. radio and a Tekin* 411P speed controller. Both are proven race products that will serve you well and complement the Junior Two nicely. Because I'm primarily interested in the stock racing class, for a powerplant, I chose the Trinity* Equalizer—a 27-turn, tamper-proof stock motor.

When you've selected your electronics and gathered your tools, stop! Savor this moment! Get psyched! Remember, you're about to create a winning machine. Every step is important, every adjustment crucial. How and what you assemble will separate you from the pack when you hit the racetrack. Loose assemblies and lost nuts have ended more races than you think!

THE KIT

The Junior Two kit consists of a molded-composite chassis (rather than a laid-up graphite unit), a polycarbonate body, tires, rims and a set of parts bags marked "A" through "G." Open only one bag at a time and follow the proper sequence, or you could have difficulties. As always, it's helpful to read the instructions before beginning.

Because it comes with pre-cut and bagged parts, the Junior Two package is superior to other entry-level kits. There are no sharp parts trees to deal with, or flashing to cut or sand off. This not only makes for a nicer finished product, but it also saves time.

The kit's instructions are clear, although first-time builders might have trouble with the three-view drawings because the perspective isn't always clear. I had no serious difficulties with the illustrations, but I did have to read ahead several times to make sure I was doing things correctly.

A nice feature of the instruction booklet is the actual-size parts-identification guide for each step. To check the size of a part or screw, simply hold it against its silhouette. When I examined the contents of each bag, I was impressed by the effort Team Losi put into simplifying the building sequence while providing superior-quality parts and assemblies.

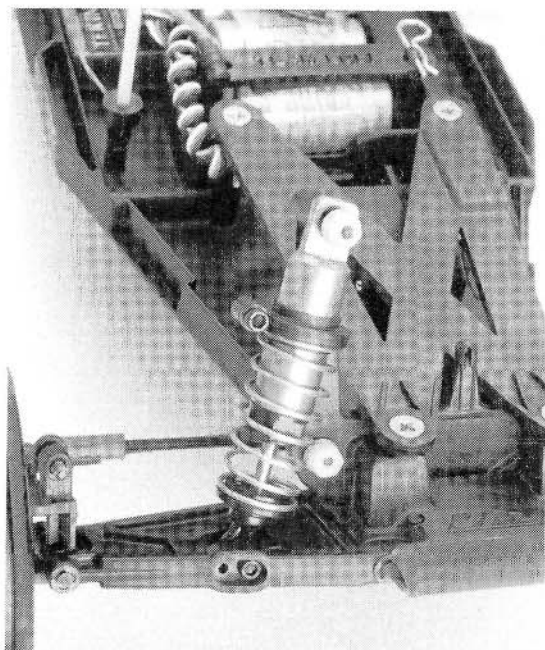
PUTTING TWO TOGETHER!

Begin with Bag A, which contains the main chassis parts, including the front and rear bulkheads, shock towers, battery box and front A-arms.

The chassis' unique molded design is the result of 18 months of engineering and track testing. Its lightness, stiffness and strength make it one of the most competitive stock chassis available, and the drilled and tapped holes make assembly truly enjoyable.

The front end is equally well-thought-out and, like most successful designs, it contains few parts. The steering setup is of the turn-buckle type, and it must be kept free of tightness and binding.

The set-up tool comes in handy



The shocks on the Junior Two are identical to those on the original JR-X2. They're oil-filled and have unique cartridge seals for easy assembly. The upper chassis brace (which stretches from the battery box to the front end) makes the chassis even more rigid than the graphite ones used on more expensive cars!

junior two

for adjusting the front camber rods and steering tie rods. The recommended camber is between 2 and 5 degrees negative; this means that the tops of the tires lean inward (i.e., towards the car). The more negative camber you use, the better your high-speed steering will be. Rear camber should be set at 3 degrees.

Team Losi recommends that you set the front ride height so that the front A-arms are parallel with the front bulkhead when the car is completely assembled and the radio gear and battery have been installed. If you raise the ride height any more, the car's nose will stay a little higher on jumps, but you'll decrease steering response.

For the rear ride height, it's recommended that you point the drive shafts slightly downward. When inspecting the ride height, judge the angle of the suspension in relation to the drive shafts and not the H-arms. (I *still* caught myself

looking at the H-arms!) Initially, use the plastic set-up tool to position both the front and rear ride heights.

Bag B contains a new feature for the Junior Two—a protective front stiffener, which not only protects your servo from being damaged in a crash, but it also stiffens the chassis noticeably.

Bag C contains the gearbox. This is the car's most crucial component and it must perform smoothly, so it's important to take your time and follow the instructions carefully. Problems might not surface for several races, but a slippery diff can really cause you a lot of headaches, so be careful!

The assembled diff has a hole through which it can be loosened or tightened, and Team Losi provides excellent diff-adjustment tips in the manual's appendix. If you're a serious racer or a beginner looking to hop-up

Type Off-road
Scale 1/10
Sug. Retail Price \$199.95

DIMENSIONS:
Overall Length 15 inches
Width 9.75 inches
Wheelbase 11.25 inches
Front Track 8.75 inches
Rear Track 8.5 inches

WEIGHT:
Gross (w/ battery) 3 pounds,
5.48 ounces

BODY:
Type Single-seat buggy
Material Polycarbonate

CHASSIS:
Type Tub
Material Injection-molded
composite

DRIVE TRAIN:

Primary Gear
Transmission Gear
Differential Ball
Bearings/Bushings Bushings

SUSPENSION:

Front: Type Single A-arm with
upper control link
Damping Oil-filled,
coil-over shock
Rear: Type Single H-Arm with
upper control link
Damping Oil-filled,
coil-over shock

WHEELS:

Front: Type One-piece nylon
Dimensions (DxW)
2.1x.875 inches
Rear: Type One-piece nylon
Dimensions (DxW)
2x1.375 inches

TIRES:

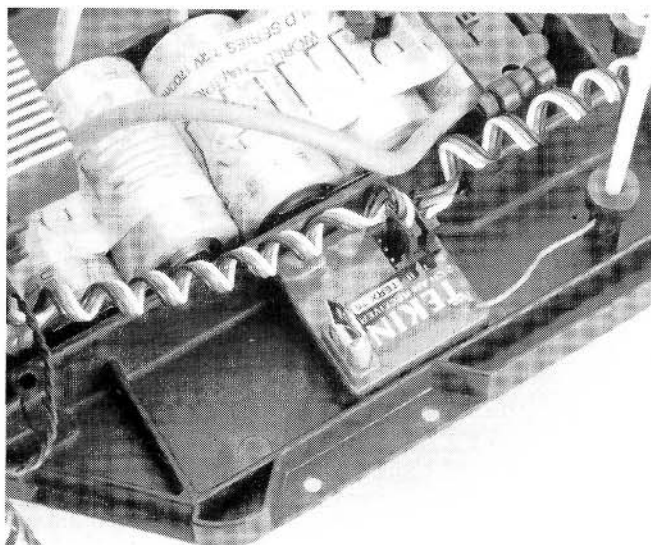
Front Ribbed
Rear 4-row spike

after a few wins, Team Losi recommends the use of "hard balls" (part nos. 4016 and 4017). Maintenance is required for this setup—the balls, thrust washers and center diff gear must be cleaned with a pipe cleaner after every weekend of racing—but this will prolong the life of your washers and

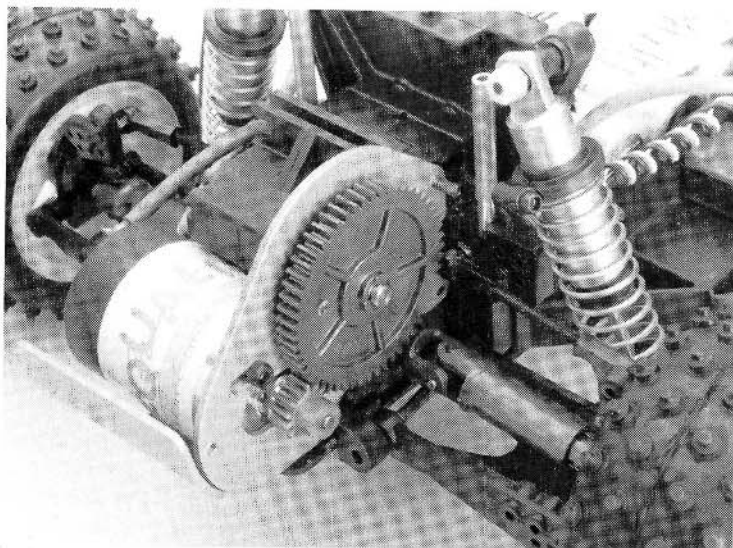
balls considerably.

Bag D contains the rear arm assemblies. Use care when assembling the rear pivot joints, as there are spiral pins of several sizes from which to choose. On one assembly, I chose the wrong pin and had to knock it out with a vise and a nail.

The shocks (Bag E) were



A Tekin TERX receiver fits nicely into the cavity alongside the battery tray. Trinity's 1700mAh packs provide the power.



With the exception of the 32-pitch pinion and spur gears, the Junior Two's transmission is the same as the JRX-Pro's.

ELECTRICS:

Motor None
Battery None
Speed Controller None

OPTIONS AS TESTED:

Trinity Equalizer stock motor; Tekin 411P electronic speed controller; Futaba Magnum Jr. with FP-132SH servo and Tekin micro-receiver.

COMMENTS:

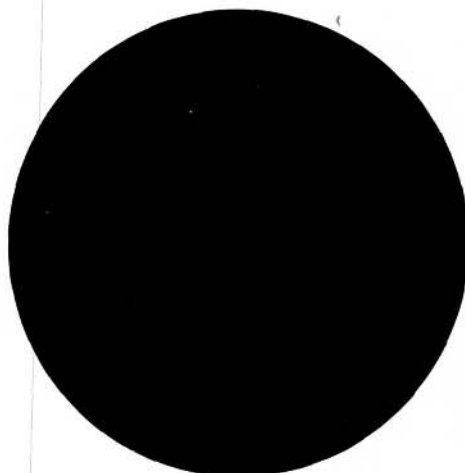
The Junior Two offers an impressive list of features, including a composite molded chassis, a front-end stiffener and, most important, a world-class transmission. It's a wise investment for entry-level racers, who can easily hop-up the car as their skills and budget allow. Although the kit doesn't include ball bearings for the axles, they can be added to increase speed and run times.

a pleasure to assemble. The assembled volume compensator (cartridge) is self-contained. As with all shock assemblies, be sure to fill the shocks properly with damping oil, or you'll create air bubbles that can hinder your car's performance. Be sure to assemble the shocks with the socket nuts pointing away from the car body. This will allow you to get at them in a hurry to make adjustments between races.

Bag F is full of rubber and rims. The Junior Two tires are made of real rubber compounds and should perform well on most track surfaces. Be sure to use cyanoacrylate adhesive (CA) to hold the tires onto the rims. Don't over-tighten the nylon nuts, or you could bind the wheels.

Now you're ready for the electronic goodies and the powerplant. Once again, take your time; this step is crucial to your car's perfor-

(Continued on page 86)



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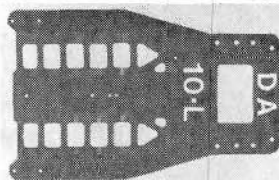
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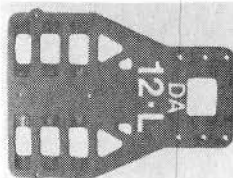
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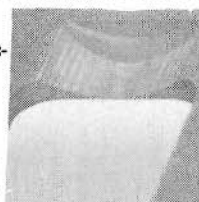


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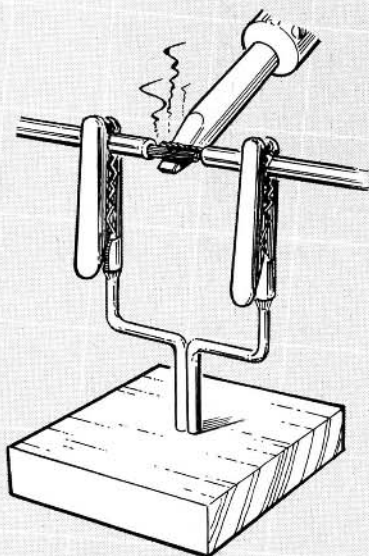
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PIT TIPS

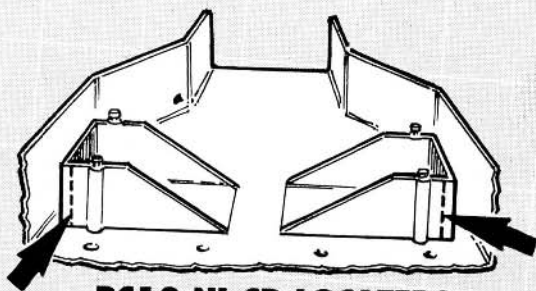
by JIM NEWMAN



SOLDERING JIG

When you're soldering two wires together, hold them with this simple device made of coat-hanger wire and alligator clips that have been soldered or epoxied together.

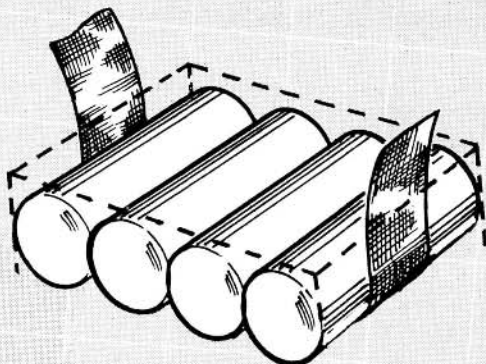
Neal Panchuk, Elora, Ontario, Canada



RC10 NI-CD LOCATORS

Locators make it virtually impossible to use packs with plastic end caps—the fit is just too tight. Cut away the end walls (as shown by the dashed lines), and a wide variety of 6-cell packs will fit. You might have to use Velcro® or rubber bands to stop the pack from drifting sideways.

Desmond Wong, Pomona, CA

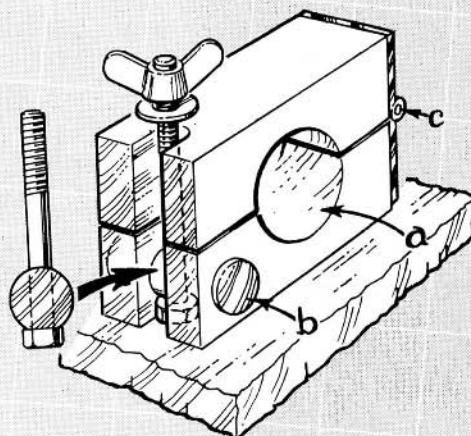


EASY NI-CD REMOVAL

Put a piece of tape or ribbon under your batteries, and they'll be easy to remove. Just pull up on the ends of the tape to lift them out.

Mike Schnurr, Berlin, NJ

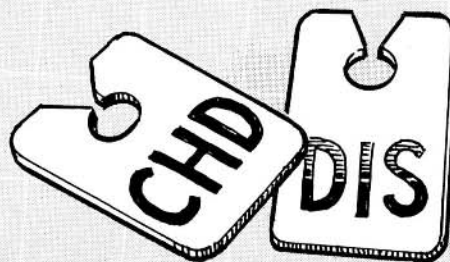
(Mike, we need your full address to start your subscription.)



MOTOR BREAK-IN STAND

Saw a slot in one end of a 4-inch-long piece of 2x4; bore 1 1/2-inch and 1/2-inch holes (a) and (b); split the wood horizontally, and put a hinge (c) at one end. A suitable bolt running through a 1/2-inch dowel (b) and secured by a wing nut clamps the stand closed to hold a motor.

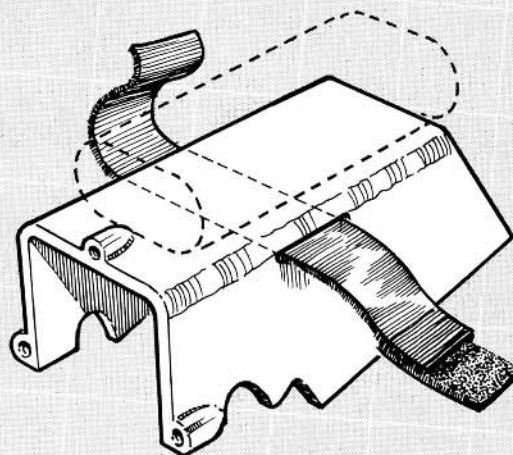
Scott Baker, Wyoming, NY



BATTERY-PACK TAGS

Bread-wrapper tags are ideal for marking charged and discharged battery packs. Use permanent markers to color them, e.g., green and red, or write on them as shown, and then clip them over the battery leads.

John Dalka, Pewaukee, WI

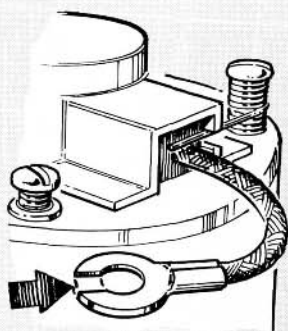


INCREASE BLACKFOOT BATTERY CAPACITY

If you can wire two similar batteries in parallel, you'll double your battery capacity and get longer runs. In the Blackfoot, the only available space is on top of the servo cover. Cut slots in the servo cover (as shown), then pass a Velcro® strap through them and around the second battery pack.

Aaron Renick, Dayton, OH

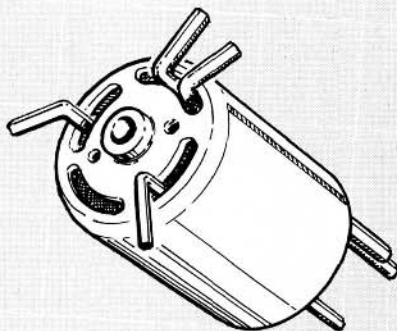
PIT TIPS



FASTER BRUSH CHANGING

Cut out a small section of the eye on a brush lead, and you'll only have to loosen the clamping screw to slip out the worn lead and slip in the new one. What's more, because you don't have to remove the screws, there's no risk of losing one.

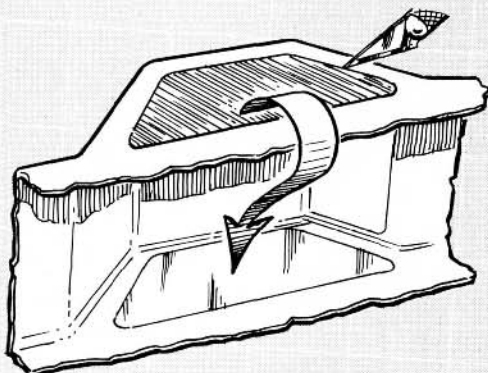
Brian Vella, Melbourne, Victoria, Australia



ALLEN-WRENCH CADDY

Here's another way to store Allen wrenches. Hot-glue an old motor case—without the armature—into your toolbox, and insert the wrenches into the air slots, where the field magnets will hold them firmly.

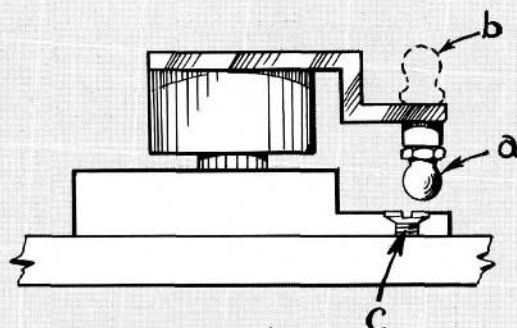
Lee Jennings, N.A.S. Lemoore, CA



EASIER WINDOW MASKING

Trimming masking to shape when you're working inside a body shell is tricky. Why not cut your masking to shape while it's lightly stuck to the outside of the opposite window? After trimming it, transfer the masking to the inside of the window (as shown by the arrow).

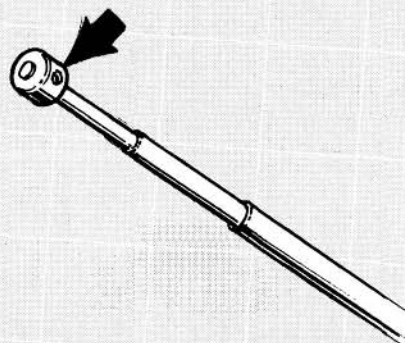
Jeremy Faust, Oswego, IL



BLACKFOOT TOE-IN

This toe-in problem also seems to affect the Monster Beetle and the Mud Blaster when their suspension is fully compressed. Solve it by installing the ball link (a) on the underside of the steering arm as shown. The dashed lines (b) show the link's original position. With the ball links on the underside, you must use flat-head screws (c) to avoid interference.

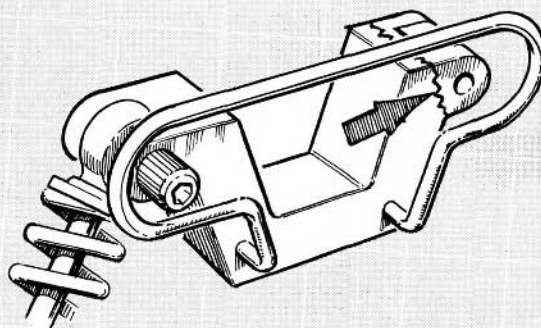
Aaron Brigati, Hampton Bays, NY



REPLACEMENT ANTENNA BUTTON

If you lose the button on the end of your antenna, it will be difficult to extend it, but a wheel collar from an R/C plane makes a good substitute.

Michael Paffenroth, Florida, NY



FX-10 SHOCK-TOWER SAVER

The highest points on the FX-10 are the tops of its shock towers, which have been known to crack during roll-overs. To protect them, drill holes in their bottoms and install a roll-over bar made of coat-hanger wire.

Warren Sharp, Knoxville, TN

Radio Control Car Action will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send rough sketch to Jim Newman, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

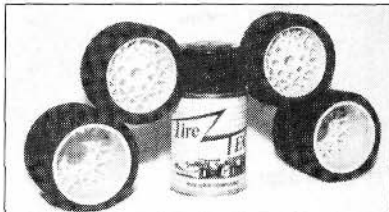
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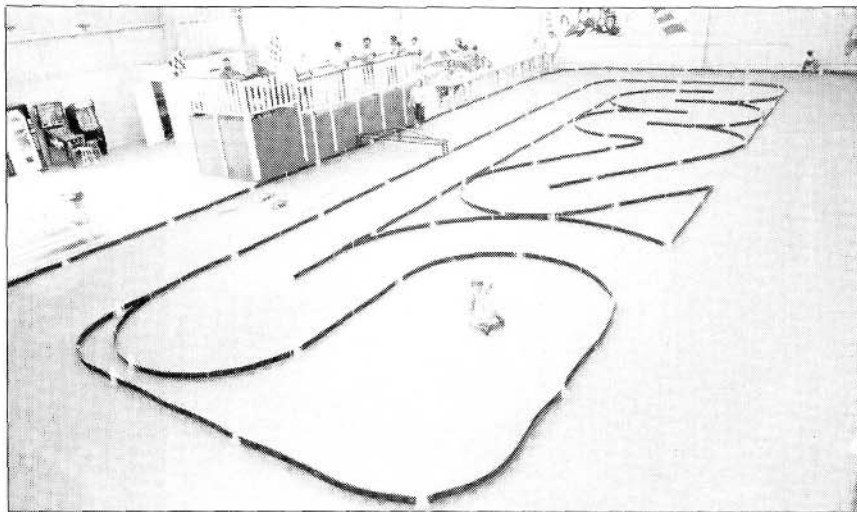
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HOT TRACKS

Here's another in our "Hot Tracks" series of outstanding R/C race courses. To see your favorite track featured here, send us good black-and-white photos and a description of its delights! (approximately 500 words). Send your entries to Hot Tracks, Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897.



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A racer's paradise! The first indoor track in Hawaii, Performance Hobby & Raceway is an R/C oasis in the middle of a residential/light industrial area in Honolulu. Mark Oaks and his crew have done a knockout job in transforming this former warehouse into a topnotch raceway. They eliminated every trace of the building's earlier inhabitants: its interior has been totally repainted; and the lighting, ceiling fans and other fixtures are brand-new.

You reach the track through the Performance Hobby Shop—900 square feet of the latest stuff for R/C cars, boats, planes and helicopters. Beyond the grandstand, there's a 4,800-square-foot track. It's well-carpeted with Ozite, and its layout allows drivers to make a quick transition from the flat oval outside to the infield roadcourse. The track's barriers are made of flexible Plexiglas strips that are bolted to pipes set into concrete. Heavy rubber strips are laid over the Plexiglas to reinforce high-traffic areas.

The elevated, carpeted, drivers' stand overlooks the front straight-away. At one end of the stand is the "control tower" from which a race computer keeps tabs on the drivers and their lap times, while displaying the totals on a board. The PA and stereo systems are within arm's reach. Behind the stand, drivers work on their cars in the pit area, which accommodates as many as 75 racers. AC outlets line the far wall, and there's an air compressor for track users.

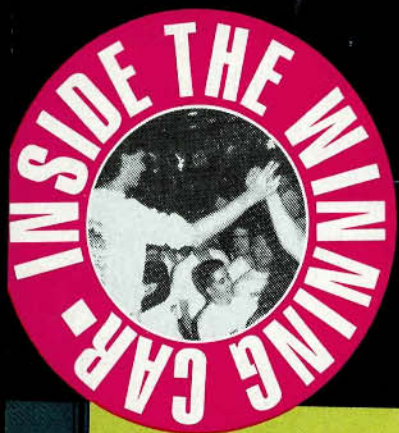
Plans are being made to accommodate off-road racers. Removable carpeted jumps will be put on the track to give buggy and truck racers a real challenge on a speedy course. Smart move!

If you're in Hawaii and you want to race, check out Performance Hobby & Raceway at 950 Robello Lane, Honolulu, HI 96817. Call (808) 842-5664; track info: 842-5464; fax: 842-5780.

Ebert's Ozite

ASSAULT WEAPON

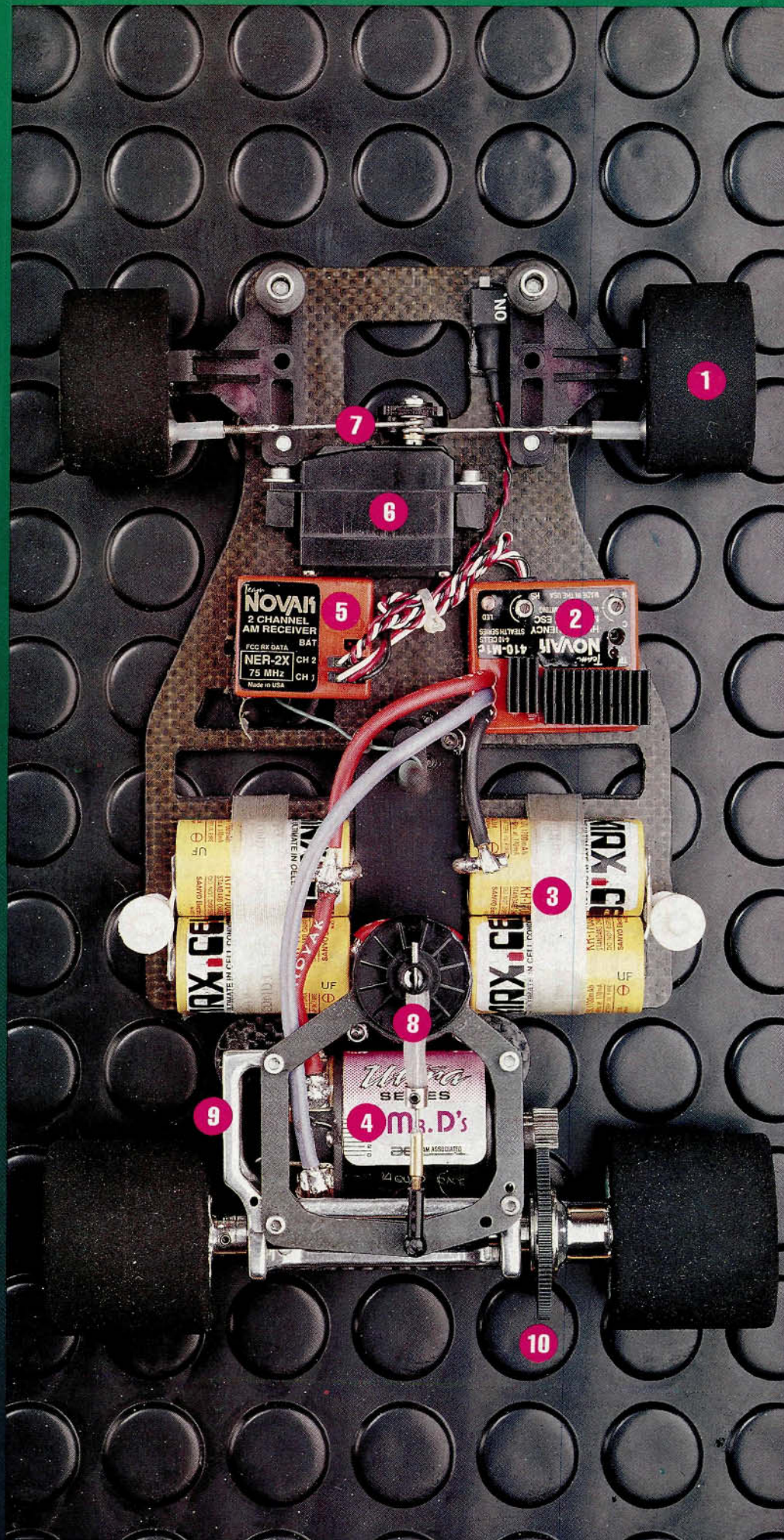
at Cleveland Champs



THE "GREEN gas-tank syndrome" affects all racers. It's not a disease, just a tendency for racers to play follow the leader. Here's how a drag-racing veteran explained it: "When someone shows up on Saturday with a green gas tank and wins, everyone shows up with one on Sunday."

by STEVE POND

There's no obvious advantage to running a green gas tank, but racers want to go fast. If they think it will help to have one, they'll try it. The danger of this approach is that what works for one car may not work for another. A car that handles well or goes faster than others is the result of a combination of modifications and setups. An accomplished driver or mechanic may know something about a car's setup that we've yet to stumble across, and that's why getting a peek at what the fast guys are doing continues to be the best source of information on how to set-up your car for competitive racing.



1. Associated green-dot tires, front and rear
2. Novak 410-M1c speed controller
3. Max Cell Conditioned Sanyo 1700s
4. Reedy Mr. D 14-turn Quad
5. Novak Ner-2x mini-receiver
6. Futaba 132H high-speed servo
7. Corrally center-point steering system
8. Teflon damper discs and silicone-tubing damper
9. Custom one-piece aluminum rear pod.
10. Du-Mor 98-tooth spur gear; ceramic diff balls; Jammin' Jay diff rings

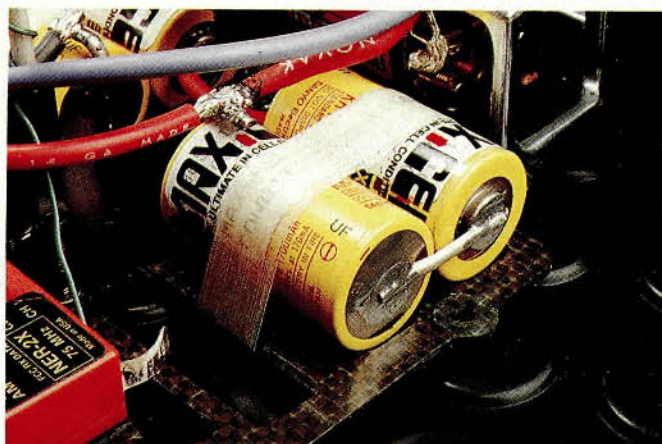


Flat spots were machined on the wheel hub and the axle so that Team Losi's Jammin' Jay diff rings could be used. The 1/8-inch ceramic diff balls produce a super-smooth diff action.

Father-and-son team Roy and Mike Ebert agreed to let us look at their 1/12-scale car, which recently won the 1990 Cleveland Indoor Championship—an event that drew the biggest names in 1/12-scale racing. They owe their success to excellent driving skills and to their ability to make a car handle extremely well. Here's a detailed account of what the Eberts did to

make their car a winner.

To give the car a "trick" look and to strengthen the nylon parts, Mike dyed all the nylon and fiberglass parts of an Associated* 12L basic graphite kit. The chassis-plate edges were rounded with a file so that they wouldn't snag the carpet. The battery slots were also rounded so that they wouldn't tear the battery's shrink-wrap and the cells



Max Cell "conditioned" batteries were soldered together with silver rod—an excellent electrical conductor.

would fit into the slots properly. Holes were drilled and countersunk in the front of the chassis for the servo mounts. With this method, the servo can be solidly mounted; you don't have to rely on two-sided servo tape to hold it in place.

To make the suspension smoother, Mike polished the pivot balls that support the T-plate. To increase

damping and reduce bouncing, he replaced the stock damper spring with a section of model fuel tubing, and he used a medium-viscosity silicone lube. The damper disks that allow for side-to-side rear-pod damping were also modified for smoother action by attaching additional Teflon disks.

A DIFFERENT DIFF

The stock axle was ma-

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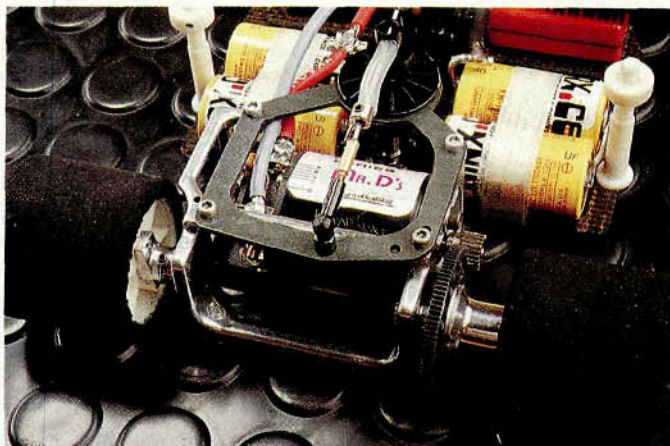


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On-board electronics include a Novak 410 M1c, a Ner-2X speed controller and a receiver. Steering linkage is a Corally center-point setup.



Polishing the edges of the aluminum rear pod (manufactured by Stephan Oberle) saved weight and improved its appearance.

chined to accept a locking ring, which provided more precise differential action. To accommodate Team Losi's* Jammin' Jay diff rings (they're very popular in off-road racing), two flat spots were machined into the shoulder that holds the diff rings in place. These rings eliminate slipping, and they're surface-ground to make them as flat and smooth as possible. For

even smoother action, the axle was machined so that a bearing could be put in the spur gear's center.

The spur gear was a Du-Mor* 98-tooth thin gear with a series of holes drilled in it to reduce weight and rotating mass. The spur is filled with what the Eberts call the "family jewels," i.e., precision diff balls made of ultra-hard ceramic material that gives an in-

credibly smooth diff action. After some experimentation, the Eberts found that these diff balls worked well, but they're very expensive. (The decision to market them hasn't been made yet.) The diff is lubricated with Team Associated's standard diff lube.

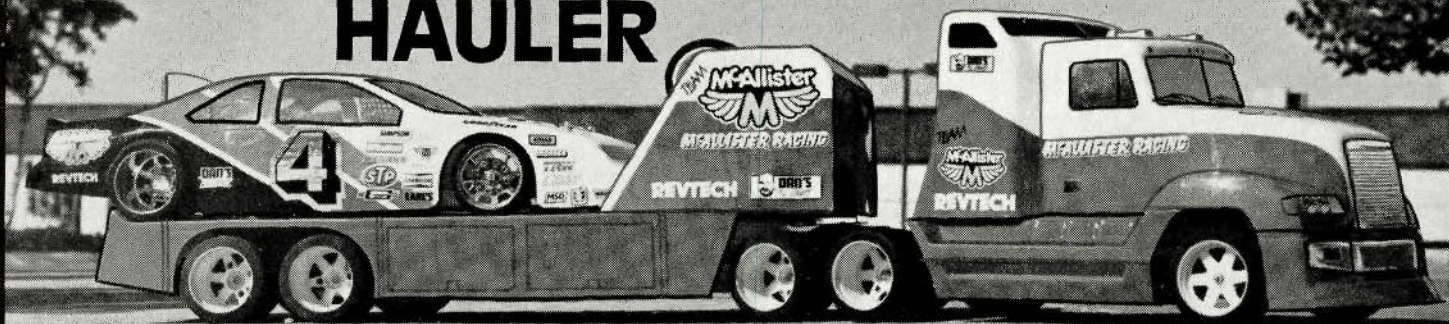
To install the diff and axle assembly in the pod, Mike used machined aluminum spacers in place of

the original thrust bearings. To reduce the binding that's associated with stock thrust bearings, the aluminum spacers (made by friend Jim Hoffman) ride on the inner race of the axle bearings.

The one-piece aluminum pod used on Mike's car was made by Stephan Oberle, and it replaces the stock nylon pieces. The pod's

(Continued on page 60)

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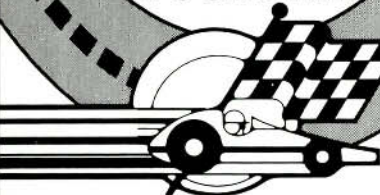
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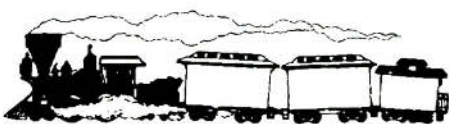
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INSIDE THE WINNING CAR

aluminum edges were ground and polished to improve appearance and to reduce weight. The T-bar with which the pod is attached to the chassis is a factory replacement (Associated part no. 4330). The T-plate, which is thinner (.062 inch) than the standard unit, allows more side-to-side movement. To make the motor more accessible for soldering, the pod's graphite upper

a 22-tooth pinion for an overall ratio of 4.45:1. The motor has Reedy's Ultra Cut brushes (no. 3513) and Ultra springs (no. 3514). To reduce the tension on the brush, the springs were bent to 90 degrees.

Finishing off the chassis is a Futaba* S132H servo fitted with a Kimbrough* servo saver and a Corally* center-point steering link-



To make suspension action smooth, white Teflon disks are attached to the upper and lower damper disks.

plate was also modified by removing the web across the center.

For the front suspension, one "zero" shim was placed under each stock arm to lower the car's ride height. No caster shims were used. Associated's .024 springs (no. 4116) were used between the suspension arms and the steering blocks.

The tires used to win the race in Cleveland were Associated's green tires (no. 3625) in the rear (cut to a 1.78-inch diameter) and their high-traction green dots in the front (cut to a slightly smaller diameter of 1.76 inches). The rear tires received a liberal dose of Paragon* Ground Effects tire-traction compound, while the front tires were coated only on the inside third of the tire.

PERFECT POWER

The electronics included a KO* EX-1 radio system. To save weight, the system was modified with a Novak* NER-2X receiver. Novak's new 410-M1c high-frequency electronic speed controller transmitted the battery power to the motor. A set of Max Cell "conditioned" Sanyo* 1700mAh batteries provided the power for the A-Main win. To reduce resistance between the cells, the batteries were soldered together with heavy-gauge silver wire.

At the other end of the speed controller there's a Reedy* Mr. D's Ultra Series 14-turn quad motor fitted with

age. The center-point steering linkage eliminates the Ackerman effect (the inside tire turns more than the outside tire), which can scrub off speed through the turns.

Mike covered his winning car with the BBR Lotec body that Rick Hohwart made popular at the 1/12-Scale Nationals. Painted by Bruce Aristeo, the body has a Bud's* stabilizer wing to increase downforce in the rear. There's one more important ingredient that Mike always adds to his list: practice. "It's not part of the car, but it's always a part of any winning combination."

Congratulations to Mike and Roy Ebert for winning the Cleveland Indoor Champs.

**Here are the addresses of the companies mentioned in this article:*

Associated Electronics, 3585 Cadillac Ave., Marina Del Rey, CA 90292.

Team Losi, 13848 Magnolia Ave., Chino CA 91710.

Du-Mor R/C, Inc., 1002 Union Landing Rd., Cinnaminson, NJ 08077.

Paragon Racing Products, 690 Industrial Circle So., Shakopee, MN 55379.

KO Propo, distributed by Global Hobbies, 10725 Ellis Ave., Marysville, CA 95901.

Novak Electronics, Inc., 128-C Dyer Rd., Santa Ana, CA 92707.

Sanyo Electric, Battery Division, 200 Riser Rd., Little Ferry, NJ 07643.

Reedy, distributed by Associated Electronics.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

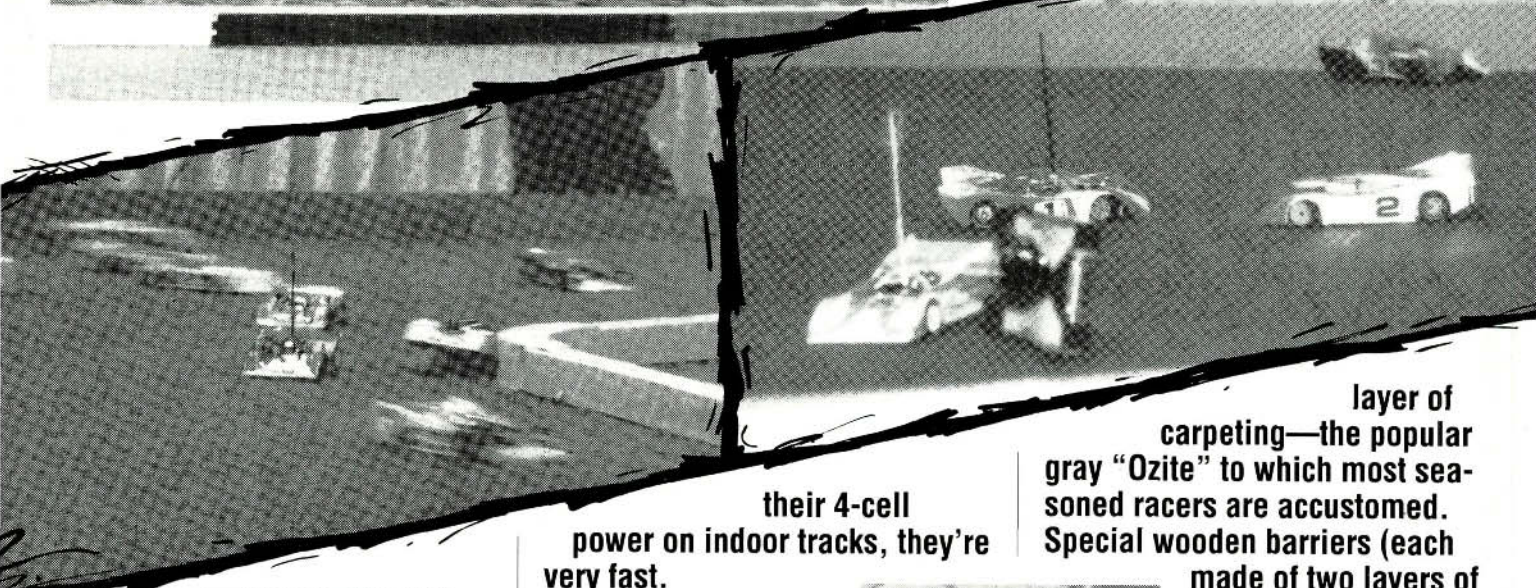
Kimbrough Products, 1420 East St. Andrews Place, Unit F, Santa Ana, CA 92705.

Corally, distributed by Du-Mor.

Bud's Racing Products, 1575 Lowell St., Elyria, OH 44035. ■



BUCKEYE blow o u



their 4-cell power on indoor tracks, they're very fast.

layer of carpeting—the popular gray “Ozite” to which most seasoned racers are accustomed. Special wooden barriers (each

made of two layers of 2x4) were built to separate the lanes of traffic. These were beautifully laid out to form a tight, “technical” course with eight right turns and eight left turns. While some



Car Action author Mike Hicks (from the Great White North) demonstrates the intimidation technique he uses in front of the drivers' stand before his heat. Mike says, “One look at this face, and they're bound to hit the boards!”

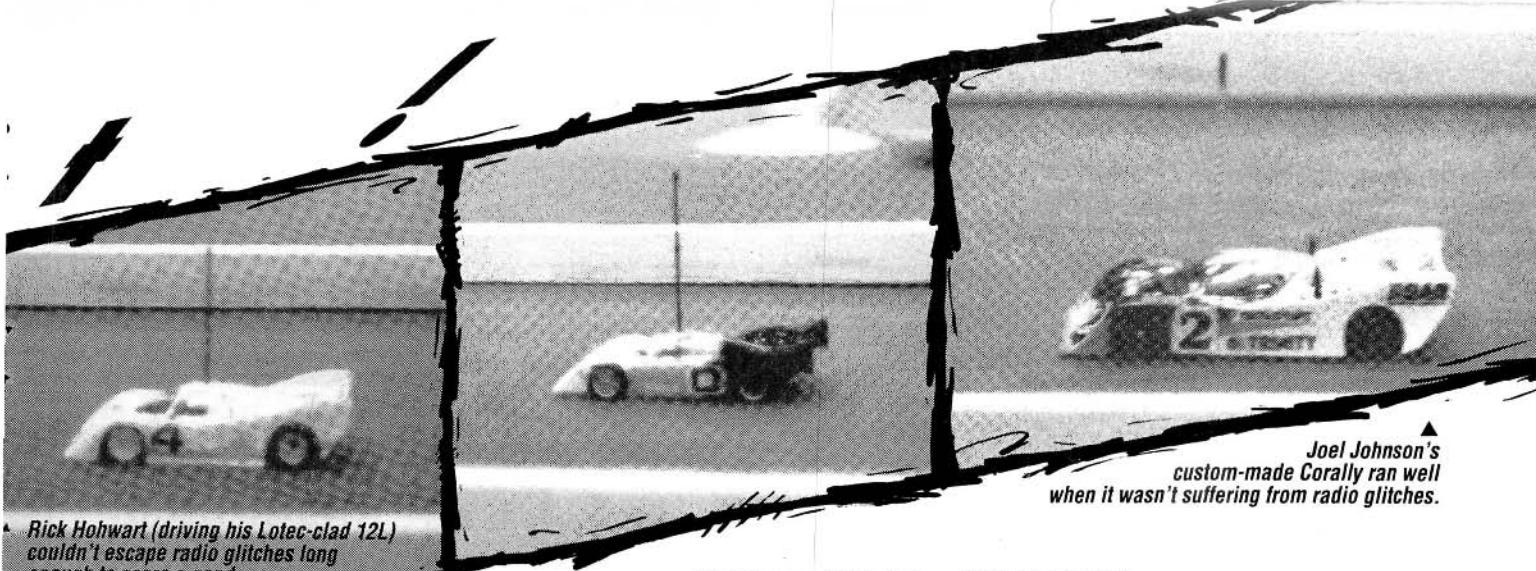
THE CLEVELAND INDOOR CHAMPS (CIC) is one of the most grueling tests of 1/12-scale cars and their drivers. Although it doesn't offer a national title, the event attracts some of the biggest names in R/C racing. The action is exciting, too: 1/12-scale cars are smaller and much more responsive than their 1/10-scale counterparts, and despite

BALLROOM DRIVING?!

Last year's Indoor Champs was held at the Holiday Inn in Independence, OH. Racing took place in the hotel's ballroom on a track that was specially constructed for the event. Sheets of wood provided a firm base for the top

by
STEVE
POND

CLEVELAND Indoor Champs



▲ Joel Johnson's custom-made Corally ran well when it wasn't suffering from radio glitches.

Rick Hohwart (driving his Lotec-clad 12L) couldn't escape radio glitches long enough to score a good qualifier.

of the corners were shielded by "corner dots" to prevent drivers from cutting them too closely, others were of bare wood and caught more than a few inattentive drivers. The CIC is exclusively for 1/12-scale cars, with 8-minute heats in both the Stock and Modified Classes. For last year's competition, it was decided that the competitors would run the newer-style GTP bodies instead of the old TOJs. The TOJs have been extinct in full-scale racing for some time, and

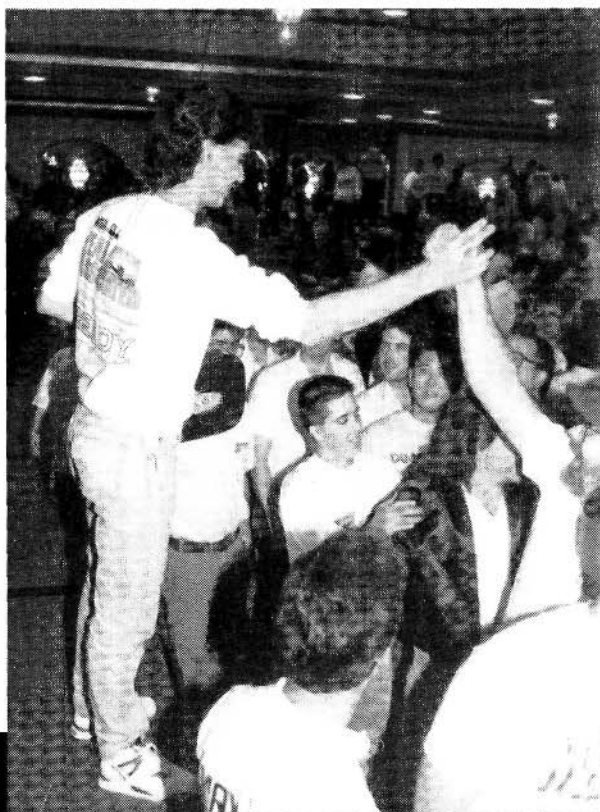
(Continued on page 64)



▲ Almost every car in the Modified A-Main lineup was accompanied by a crewman toting a "bump box" for a last-minute charge.



▶ Erik "Von Quick" Soderquist performs his amazing car-balancing act. Baffled onlookers couldn't imagine how Dr. Quick managed to keep the car on end for so long, but ultra-high-speed photography caught his lightning-fast right hand coming in to help.



it was only fitting that the R/C racers should run more contemporary bodies.

As usual, the Indoor Champs drew more than 300 entrants. This made the schedule especially tight, because the races ran for 8 minutes, instead of the 4 we're accustomed to with 1/10-scale racing.

REVVING UP

The event was kicked off with a drivers' meeting early on Thursday, November 23. Race organizers gave the usual pep talk and stressed that the racers should all run on "legal" frequencies. At a race of this scale, it isn't unusual for some of the well-traveled

drivers to use radios set to frequencies that are acceptable in foreign countries, but not in the States. The officials didn't want to set a bad example by allowing the use of these radios, so they gave the drivers fair warning: use 'em and you're out! This later became the event's biggest controversy (see the sidebar).

To ensure that all the drivers had the same shot at practicing on the track, the course layout wasn't divulged to anyone before the event. A schedule (referred to as "T-time") was implemented to allow the drivers equal track time. Some complained that they didn't have enough time to set-up their cars, but as long as every-

◀ Modified Class winner Mike Ebert does some high-five'n at the end of the A-Main.

MODIFIED A-MAIN

FIN	QUAL	NAME	CHASSIS	RADIO	STEERING SERVO	ESC	BATTERIES	CHARGER
1	3	Mike Ebert	Assoc. 12L	Fut. Mag Sr.	Futaba 9601	Novak M1c	Max Cell 1700	Class Racing
2	7	Mike Blackstock	Assoc. 12L	Fut. Mag Sr.	Airtronics	Novak M1c	Reedy 1700	Novak Peak Plus Linear
3	8	Terry Rott	Assoc. 12L	KO EX-1	Airtronics	Novak M1c	Sanyo Matched 1700	Novak Peak Plus
4	4	Tony Neisinger	Assoc. 12L	Futaba PCM	Futaba S132H	Tekin 411P	CAM 1700	Tekin 100L
5	10	Bud Bartos	Assoc. 12L	KO EX-1	Airtronics 94143	Novak T-1	Power Push	Power Push
6	2	Chris Doseck	Assoc. 12L	KO EX-1	Airtronics 94143	Novak M1c	Ace Pilot/CAM	Novak Peak Plus Linear
7	1	Joe Lawrence	Wood Racing	KO EX-9	Airtronics	Tekin 411P	Peak/Advantage	Tekin 100L
8	5	Bill Jeric	Corally	KO EX-1	Futaba 132H	Novak M1c	Power Push 1700	Turbo Charger
9	9	Frank Calandra	Corally SP12	KO EX-1	Futaba 132H	Corally	Bullet Matched 1700	Class
10	6	Mike Seubert	Corally	KO EX-1	Futaba 132H	Tekin 411P	Team Smooth 1700	Novak Peak Plus Linear

STOCK A-MAIN

FIN	QUAL	NAME	CHASSIS	RADIO	STEERING SERVO	ESC	BATTERIES
1	7	Sean Cochran	Delta P-12 Spyder	KO EX-1	Futaba 9601	Tekin 411P	A&D Select Cells
2	3	Wayne Penfold	Assoc. 12L	Fut. Mag. Jr.	Novak	Novak M1c	HRS Speed Systems
3	4	Bill Schoenau	Corally	KO EX-1	Futaba 132H	Corally	Team Smooth 1700
4	8	Stephen Charles	Assoc.	Futaba PCM	Futaba 9601	Novak T-1	Advantage Matched 1700
5	1	Jim Piersol	Delta P-12 Spyder	Airtronics XL2P	Futaba 9601	Tekin 411P	A&D Select Cells
6	9	Clayton White	Delta P-12 Spyder	Futaba PCM	Futaba 9601	Tekin 600	Stage III
7	6	Bill Worrel	Corally SP 12	KO EX-1	Futaba S132H	Tekin 411P	Advantage Matched 1400
8	2	Chuck Sommers	Corally	KO EX-1	Futaba 132	Tekin 700	Leading Edge 1700
9	10	Chuck Mackin	Assoc. 12L	KO EX-1	Futaba S132H	Tekin 411P	Power Pushed 1700
10	5	Willy Decker	Corally SP12	KO EX-1	Futaba 132	Corally	Bullet 1700

one had the same chance to practice, no one had an advantage.

The racing was scheduled as follows: Two rounds of stock and modified on Friday and Saturday, Mains on Sunday.

SUPER STOCK

The highlights of Stock qualifying included performances by Jim Piersol and Chuck Sommers. Although these drivers ran in separate heats, they waged a war for the TQ spot, which Piersol won by a narrow margin. In the fourth round of the D-heat, Piersol completed a 39-lap run in

8:05.44 driving a Delta P-12 Spyder. Sommers (who ran in the A-heat) also turned in a smokin' 39-lap run, but he could only manage a time of 8:08.80 with his Corally SP-12.

Driving an Associated 12L, Wayne Penfold was the only other driver to turn 39 laps (in 8:10.04). The rest of the A-Main qualifiers were Bill Schoenau, Willy Decker, Bill Worrel, Sean Cochran, Stephen Charles, Clayton White and Chuck

Mackin.

The Modified Class was home to many of the event's celebrities (who are too numerous to mention!), and this made for the most hair-raising qualifying I've ever seen. Early on, a battle shaped up between friendly rivals Chris

Doseck and Joel Johnson, and after their practice runs, these two looked like the ones to beat.

During qualifying, Doseck completed strong 42- and 43-lap runs with his new version of the Associated 12L running

(Continued on page 67)

Trackside Team Class chargers were one of the many conveniences available to racers. The sign on the rear wall promised a charger to the first competitor who finished a qualifying run in 8 minutes.



MOTOR	BODY	TIRES	TRACTION COMPOUND	SPONSORS
Reedy	Lotec	Assoc. Green	Par. Ground Effects	Associated, Reedy, Novak, Max Cell, Paragon, Du-Mor, GPA Hobbies
Reedy Ultra Series	Bud's Nissan	Yokomo	Paragon	Reedy, Associated, Novak, Paragon, Futaba
East Coast Mod	Bolink Nissan	Yokomo	Par. Positraction	East Coast Motors, Associated, Novak, Advantage, PTI, Bolink, Bud's
CAM	Bud's Nissan	Yokomo	Special Blend	CAM Motors, Associated, Futaba, Tekin, Bud's, Autographics
Bud's	Bud's Nissan	Du-Mor PD	Paragon	Bud's/Power Push
CAM	Bud's Nissan	Yokomo	Paragon	KO Propo, CAM, Associated, Novak, Ace Pilot, Paragon
Peak Perf.	Lotec	Du-Mor PD	Racer's Choice TQ Mod	Peak Performance, Advantage, Tekin, Wood Racing, Racer's Choice
Twister	Bud's Nissan	PK Positrac	Racer's Choice TQ Mod	Du-Mor, Novak, Twister, Power Push, Kyosho
CAM	Lotec	Du-Mor PD	Racer's Choice	Class Racing, CAM Motors, Du-Mor, Bullet, Racer's Choice, Corally
Twister	Bud's Nissan	PK Green	Paragon	Twister, Du-Mor, VRP, Team Smooth

CHARGER	MOTOR	BODY	TIRES	TRACTION COMPOUND	SPONSORS
Tekin 100L		Lotec	TRC Green	Paragon	A&D, Tru Hobbies, Pro Car, Paragon, Team Class, R&R
Tekin 100L	H	Lotec	Trinity Magic	Par. Ground Effects	HRS
Turbo Charger	A	Bud's Nissan	Du-Mor PD Positrac	Racer's Choice TQ Mod	
Turbo Charger	N	Bud's Nissan	Minitech Green	Paragon FX11	Advantage, Minitech Tires
Linear Turbo Charger	D	Lotec	TRC Green	Paragon	A&D, Delta
Accu-Charger	O	Bud's Nissan	Delta Green	Racer's Choice TQ Mod	Delta, Stage III
Novak Peak Plus Linear	U	Bud's Nissan	Corally Silver/Gold	Paragon	Du-Mor, Advantage, Bud's Racing
Novak Peak Plus	T	Lotec	TRC Green	Paragon	Du-Mor, Leading Edge
Novak Peak Plus Linear		Bud's Nissan	Yokomo/TRC	Paragon	ALCAR, Bud's, Power Pushed
Class		Lotec	Du-Mor PD	Paragon	Class Products, Du-Mor, Bullet, Torque Performance, Ron's Auto Supply

Frequency Frenzy

One thing was made very clear during the drivers' meeting: the use of radios operating on illegal frequencies (i.e., anything other than 75 or 27MHz) wouldn't be tolerated. Many top-level racers have radios on the 40MHz band, which is legal in Europe, but not in the U.S. The ROAR rulebook clearly states that racers who are caught using these channels face ejection.

During the first round of the A-Modified heat, it was obvious that many of the drivers were having trouble with radio interference. A frequency check was called

for, and, despite the warnings, two drivers were found to be running on 40MHz. Chris Doseck and Frank Calandra were initially penalized by having their times from the first qualifier thrown out, but growing discontent among the other racers—who had been told ejection was the

penalty—prompted the race officials to reconsider their decision.

Calandra's penalty was withdrawn when he showed the tech staff that although the case of his module said 40MHz, there were actually 75-band crystals inside. That still left officials with the question of what to do with Doseck, who was clearly running on an illegal band.

After great debate, they decided to throw out the results of his first heat and deduct a lap from his best subsequent qualifier. This wasn't ejection (which caused some grumbling), but it was some consolation for the racers who were running on legal channels.

Enter Roy Weast. In his first action as the new ROAR president, Weast, arriving Saturday afternoon halfway through the event, met with Doseck and Tate McDaniels (Doseck's motor builder). At the end of their discussion, Weast decided that Doseck's penalty was too harsh and rescinded everything! This action prompted most of the drivers in the affected heat to sign a petition protesting the sudden change in the rules.

By the time the protest had been considered, it was time to run the Mains, and Doseck already had three runs that were good enough to qualify him for the A-Main. Only then was it decided to reinstate the penalty, but with the stipulation that Doseck could use a back-up run to seed him in the Main! This meant they would deduct a lap from his fastest 43-lap run, but go to his next fastest run for a final qualifying position.

This still gave him a spot on the front line for the A-Main, so where's the penalty?! Exceptions shouldn't be made because of a name. If you break the rules, you should pay the prescribed penalty—whether you're Joel Johnson, Chris Doseck, or a racer in the lower Mains. The rules should apply to all, or none!



Using units that will soon be available, LavCo's Kent Clausen and Tekin's Kevin Orton provided dyno testing for the racers.

Dyno Duo

Manufacturers often demonstrate or test new products at races. This gives them a chance to see how their product performs on the front lines (instead of a workbench), and it allows racers to check out R/C goodies before they're released.

Kevin Orton of Tekin Electronics and Kent Clausen of LAVco presented two of the most intriguing demonstrations at the Cleveland Indoor Championships. (They also helped racers tune their motors!) Both companies are developing electric-motor dynamometers for use by high-tech racers.

Tekin's Dyno was a prototype version not yet in the final stages of development. It features a "slave motor" that tells the dyno about the performance of the motor being tested. The dyno must be adjusted to supply a precise amount of voltage to each motor tested; it then generates a single reference number that tells you how well the motor is per-

forming. According to Tekin, this user-friendly dyno is designed for average racers who might find it difficult to calculate multiple readings.

Kent Clausen demonstrated the version of the Pro Dyno that was first seen at the Thunderdrome—a high-tech, high-priced unit for accomplished motor tuners. You can select the amperage you want the test motor to draw—10, 15, 20, 25 or 30 amps—and the dyno will generate reference numbers from this. You can also simulate the level of voltage supplied by a 4-, 6- or 7-cell pack. These 15 possible test conditions should cover most racers' needs.

Also on display was a newer, less expensive version of the LAVco unit. The Sport Dyno has fewer features than the full-blown unit, but according to Clausen, its lower price puts it within the reach of most serious racing enthusiasts.

CAM power. Johnson, on the other hand, couldn't put together a qualifier that was fast enough to make the feature. Driving a Corally SP12 that was custom-built by design maven Gil Losi Jr., Johnson looked like a strong contender, but he was plagued by radio problems and mechanical problems. He could only muster a 41-lap run, and that was only good enough for the B-Main.

A surprise came in the third round when talented, but unsung, driver Joe Lawrence (who was driving a Peak Performance-powered Woods Racing machine) captured the TQ spot by finishing more than 7 seconds ahead of Doseck's time! Mike Ebert topped the list of 42-lap runners with his Reedy-powered 12L. (He was driving an older 12L, because he hadn't had enough time to set-up his newer version properly.) Falling in behind Ebert for the A-Main were former World Champion Tony Neisinger, Bill Jeric, Mike Seubert, Mike Blackstock, Terry Rott, 1989 Sportsman's Cup winner Frank Calandra and Bud Bartos.

Among the celebs who didn't make the feature was 1/10- and 1/12-scale National Champion Rick Hohwart. He had many of the same problems as Johnson; radio hits blasted him back to the tail end of the B-Main. Kent Clausen, Bob Light, Carl Christy, Ralph Burch Jr. and Tyree Phillips also suffered from problems that pushed them back in the standings.

MAIN MAYHEM!

In the traditional fashion, Sunday started with the lower Mains and worked up to the feature in each class. Because the Stock Class entries outnumbered the Modifieds by a substantial margin, it was necessary to run some of the lower Stock Mains back-to-back.

In the Stock B-Main, Jim Kesserich

jumped out to any early lead with Boice and Arnold in hot pursuit. Less than 1 minute into the race, Boice pulled an inside move to take the lead. A few seconds later, though, he made a mistake, and Kesserich recaptured the top position. He

was followed by Arnold (in 2nd) and Scott Williams (in 3rd). This trio freight-trained in this order past the 7-minute mark, and then Kesserich, who was in the lead, began to lose power.

(Continued on page 127)

Accompanied by Car Action author Mike Hicks, the Canadian crew took time out of their busy racing schedule to build all the Kyosho Penske Indy cars for the Hobbico-sponsored TQ Dash.



Despite the trouble he had in the regular racing program, 1/10- and 1/12-scale ROAR National Champion Rick Hohwart collected a win in the TQ Dash.

Open Wheel Escapade

Part of the racing schedule during the Cleveland Indoor Champs was a TQ Dash, in which five willing drivers from each A-Main drove against one another with

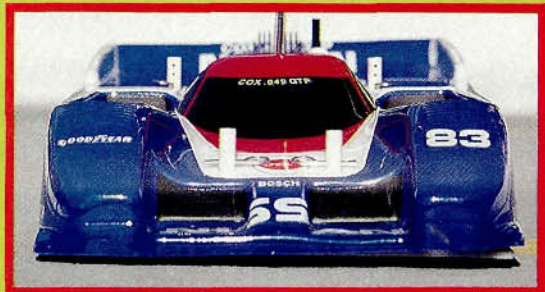
modified versions of Kyosho's new Indy and Formula 1 cars.

A group of Canadian racers graciously volunteered to assemble the cars for the most lighthearted race of the weekend. All were equipped with 4-cell battery packs, Novak ESCs and the original rubber tires, and this promised to make the race very interesting.

Although the drivers had to get used to them during the race, the Kyosho open-wheelers handled the carpet well. There was more paint swapping than usual because, this time, the drivers hit the track to have fun!

At the end of the 5-minute race, many of the drivers decided to turn their cars around and run the track backwards! Needless to say, "Mr. Kyosho" Bill Jeric, cringed as the cars running in opposite directions closed in on one another. Fortunately, they escaped unscathed and were raffled off as prizes. Rick Hohwart took the checkered flag (a highlight in an otherwise rough weekend), and 10 lucky participants went home with new cars!

Thanks to Bill Jeric and the Kyosho team for sponsoring such a great event!



GTP

COX nissan

MOST PEOPLE THINK that gas-powered R/C involves lots of money and lots of hassles, but this isn't the case. The Cox* .049 GTP Nissan is definitely the least expensive way to get into

nitro-powered fun. In fact, when you consider that you won't need batteries, expensive peak chargers or modified motors, it's probably the easiest way for a beginner to

by JOHN HUBER

PHOTOS BY STEVE POND



Getting your first glow engine started can be confusing. Unlike electric motors, most glow engines require an electric starter motor and a 12V battery. Not only is this equipment cumbersome to carry around, but it can also be expensive. Cox has eliminated this problem by including a simple pull-start with all its .049 cars.

To fire up the engine, you'll also need a glow-plug battery and clip. As its name implies, the glow battery starts the combustion cycle by making the coil of wire inside the engine's head glow bright orange. When fuel is introduced into the cylinder and the engine is turned over, the fuel becomes compressed and, if conditions are right, it ignites. Fuel-to-air mixture, throttle setting, fuel, battery voltage and weather all play a part in whether or not the engine will operate properly.

On my first test, low glow-battery voltage prevented my

NITRO ZX



get into R/C!

In a time when most car kits you buy need a motor, a radio, a speed controller—even a body!—it's nice to have everything in one

jumbo box! All I needed were a set of radio batteries, a glow battery and a can of fuel, and I was ready to burn. (Glow fuel is a mixture of methanol, oil and a

little nitromethane for an added kick.)

PUTTIN' IT TOGETHER

Thank you, Cox, for not using

engine from firing up. To test the glow battery, either remove the glow head and connect it to the battery to see how brightly the coil glows, or use a digital voltmeter (it should read 1.5 volts).

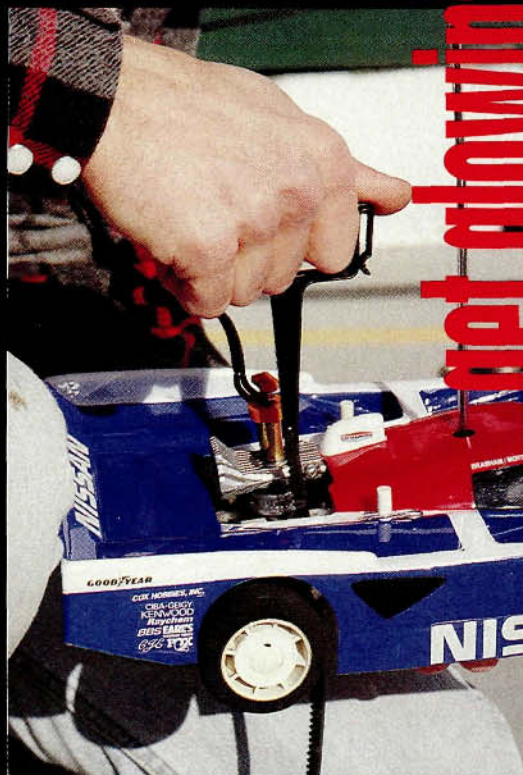
Fuel and fuel mixture are also important. Don't use fuel that has been sitting around for a long time, because elements in it deteriorate after being exposed to air. Fuel mixture is controlled by the needle valve, which sticks out of the top of the car. Turn this needle clockwise until it stops, and then turn it counterclockwise three revolutions. (This is how I set up for my tests, but your setting might vary slightly.)

To "lean" the mixture, close the valve slightly. A leaner mixture has less fuel and will burn more efficiently and provide more power. The needle-valve setting will vary with the weather, so you might have to fiddle with it, but always use the

three-turn mark as your starting point.

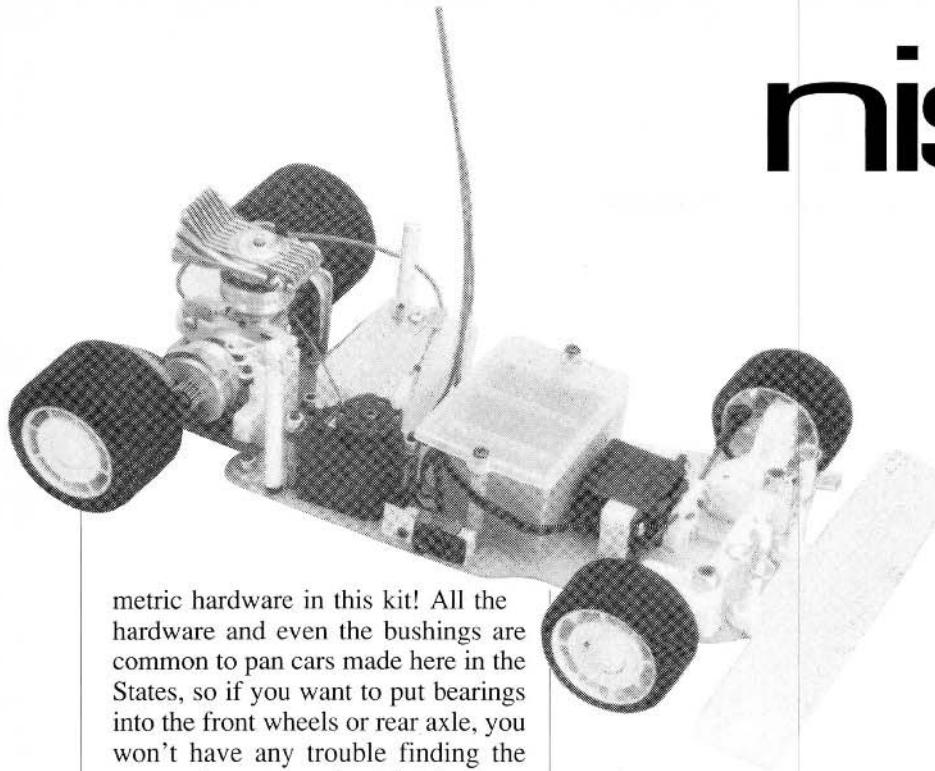
The ratchet system on the engine allows the pull-start to engage the engine and turn it over. After pulling and pulling my first time out, I noticed that the ratchet wasn't working as well as it had been before. To free up the mechanism, Cox recommends that you squirt some fuel into it to remove any contaminants.

With time, this process will become second nature for you, but if you have trouble in the beginning, I recommend that you talk to an experienced modeler. If you have a problem with your glow engine, you're probably overlooking one of the key factors. I had my share of problems with the Cox GTP Nissan because it was my first gas car, but with patience and a little help from my local hobby shop, it was soon buzzing around the parking lot!



get glowin'!

nissan



metric hardware in this kit! All the hardware and even the bushings are common to pan cars made here in the States, so if you want to put bearings into the front wheels or rear axle, you won't have any trouble finding the proper sizes at your local hobby shop.

The rear end (with the engine and axle) is assembled at the factory, and this cuts down on the building time considerably. If you already own a pan car, you'll notice many similarities between it and the Cox GTP Nissan. The rear floats on a T-plate-type suspension that has no damping. For added flexibility, the T-plate is attached to the chassis using small rubber grommets.

The front end consists of two steering blocks with suspension much like the front end of the Associated 10L. The supplied springs are light, but they'll provide sufficient travel for driving on bumpy, asphalt parking lots. Although the fiberglass chassis isn't very rigid, it should be adequate for general-purpose thrashing.

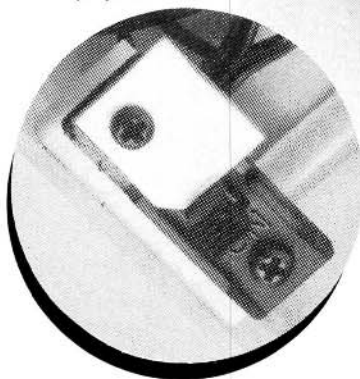
The radio equipment that's supplied with the kit includes two microserves, a receiver, an AAA battery holder and a Sidewinder transmitter. To protect it from fuel and exhaust, all the onboard radio gear is enclosed in a small plastic box. The transmitter grip is angled so it's comfortable to hold, but this makes setting it down awkward because it won't lie flat.

The car's braking system consists of a thin brass strip wrapped around the clutch bell. When the throttle trigger is pushed forward, the strip tightens around the clutch bell and slows the car. For such a simple design, it works very well.

Cox has really done its homework with the GTP Nissan. The supplied components go together well to form a fun racing machine. Note the caps that snap into the rims and add to the car's scale appearance.



The radio gear stays clean and protected inside the plastic compartment behind the steering servo. Notice the two linkages on the throttle servo. The solid wire operates the exhaust throttle, and this increases speed. To prevent the radio from being turned off accidentally, I made a small switch-locking device out of scrap polycarbonate.

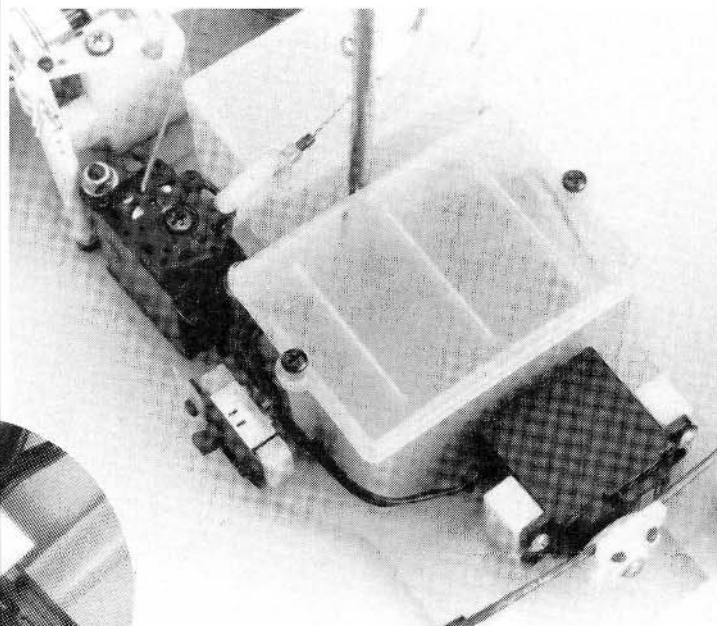


PULL, PULL, PULL!

The first time I took the Cox Nissan out for testing, I headed to a small parking lot near my house. I filled the fuel tank, primed the engine, attached the glow battery, inserted the zip-starter and pulled—and pulled...and pulled...and pulled! For almost an hour, I tried unsuccessfully to start the car. Later, I found out that my glow battery was defective, and it wasn't supplying enough current to start the engine. I replaced it and headed back to the parking lot.

This time, I had much better luck, and the car started on the first pull! Without delay, I grabbed the transmitter and put the car on the ground. At first, it was difficult to control because it had too much steering and was spinning out, but moving the steering rods to the innermost holes in the servo-saver solved this problem. In no time, the car was running very smoothly, and I was having a ball!

I'd been worried about the throttle



response, because the throttle servo is on the chassis and the engine is on the rear pod. When the suspension is compressed, it changes the throttle setting, and I figured that this could have a profound effect on control. To

nissan

my surprise, the throttle was very responsive from low idle to full bore, and the brake stopped the car on a dime. I had to show my friend Ace how much fun this car was.

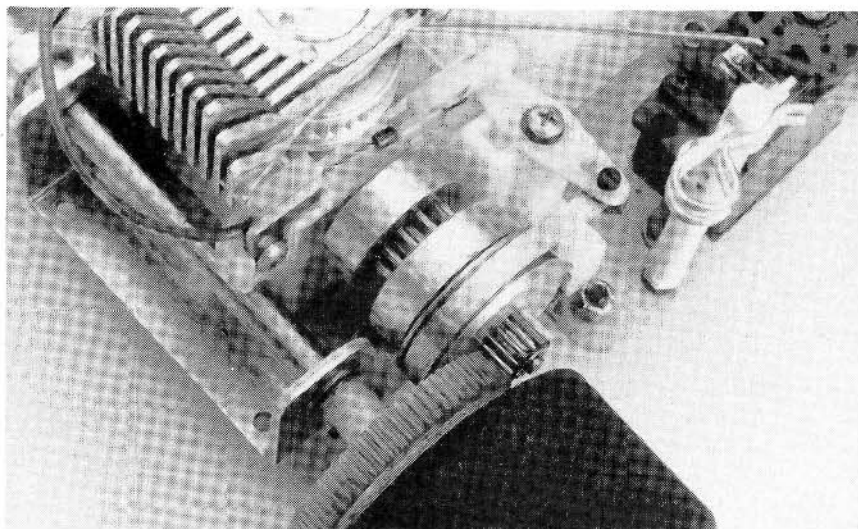
We headed for a bigger parking lot where we could really open the car up. Again, it started on the first pull and took off. I gave Ace the transmitter to see what he thought. After putting the car through his standard abuse test, he was satisfied with its handling. Then he brought it around for a close pass to see how fast it could go.

As the car came toward us, he shouted, "Hey, it won't slow down. It won't steer, either!" We jumped out of the way and watched the car streak by us. It zoomed across the lot in a slight turn, hit a curb and went soaring into the brush. The crash destroyed the car's front bumper and damaged the throttle servo, so we were done for the day. We figured that something must have hit the radio switch and accidentally turned it off. To prevent runaway, I strongly recommend that you make a locking device for the radio switch.

WHAT A GAS!

The Cox Nissan was a blast! The sound of its little gas engine screaming away was a welcome change from all my silent electric cars. The car handled well, although with the dense foam tires, it tended to "push" at top speed. Like any other fuel-powered vehicle, it has occasional starting problems, but when you're used to the

To keep brake pressure consistent throughout the rear pod movement, the brass brake strap (arrowed) is connected to the servo by a flexible cable and a bellcrank. The drive gears are 48-pitch, so with a little tinkering and a spur gear of the right size, you could mount a ball diff.



Type On-road
Scale 1/12
Sug. Retail Price \$159.95

DIMENSIONS:

Overall Length 11.5 inches
Width 6.75 inches
Wheelbase 7.9 inches
Front Track 5.5 inches
Rear Track 5.3 inches

WEIGHT:

Gross (w/o fuel) 1 pound,
6.19 ounces

BODY:

Type Nissan GTP
Material Polycarbonate

CHASSIS:

Type Pan
Material Fiberglass

DRIVE TRAIN:

Primary Gear
Transmission None
Differential Gear
Bearings/Bushings Plastic
bushings

ENGINE:

Type 2-stroke
Displacement049 cubic inch
Fuel Cox glow fuel

SUSPENSION:

Front: Type Coil spring
Damping None
Rear: Type T-plate
Damping None

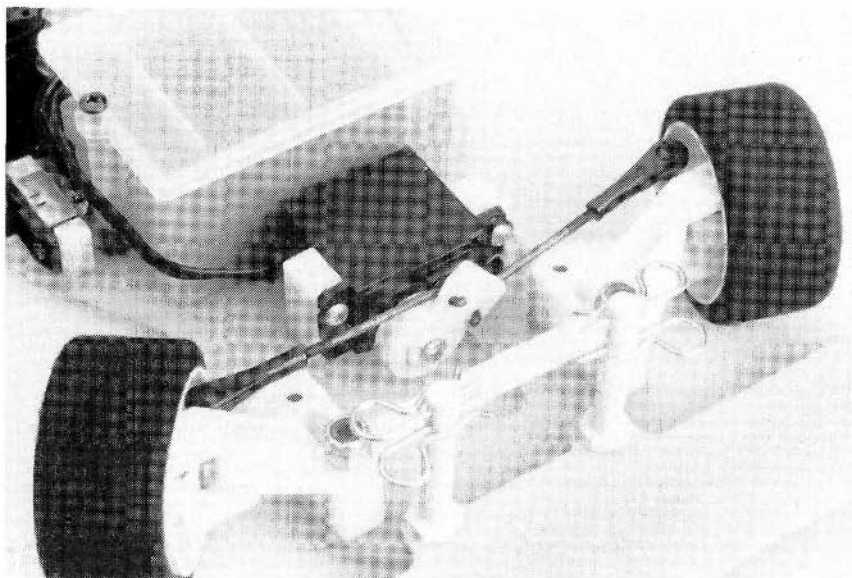
WHEELS:

Front: Type One-piece plastic
Dimensions (DxW)
..... 1.4x0.9 inches
Rear: Type One-piece plastic
Dimensions (DxW)
..... 1.4x1.4 inches

TIRES:

Front/Rear Foam

The first time out, the car's steering was much too responsive. By moving the steering rods to the innermost holes on the servo-saver, I was able to reduce the steering throw and make the car less sensitive to my commands.



THE CHOICE OF WORLD CHAMPIONS

tuning and maintenance of the engine, you'll find them easier to deal with.

Fuel power has several advantages: there's no need for a charger, numerous battery packs, motors, or many of the other accessories needed for electric cars. The Nissan's tank holds enough fuel for at least 15 minutes of running, and there isn't significant down time between runs. You don't have to wait for a battery to charge; simply refill the tank and keep goin'!

SPECIFICATIONS

OPTIONS AS TESTED:

I used only what was included in the kit. To start the engine, I use the supplied pull-starter, a 1.5V glow battery and Cox glow fuel.

COMMENTS:

For a car that's powered by an .049 glow engine, the GTP Nissan has good acceleration and top speed. With any gas car, it's important to have a fail-proof radio switch. This is a good place for beginners to start; the instructions are thorough, and everything you need comes in one box!

The Cox GTP Nissan is suitable for first-time R/Cers. It's a little messier than an electric car, and starting problems can be frustrating. Nevertheless, if you can learn the ins and outs of running a fuel-powered car, the Cox Nissan will give you more stick time than is currently available with electric power. Don't you think it's time for you to have some nitro-powered fun?!

**Here's the address of the company featured in this article:*
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SCOPING OUT

by JOHN RIST

Novak 410-MXC

THE KING IS DEAD; long live the king! Well, the old "king"—Novak's* T1X—isn't dead, but the company's new top-of-the-line speed controller—the 410-MXC—is sure to become the new king of controllers.

There are many similarities between the T1X and the 410-MXC: they have 12 FETs to handle the power; they're about the same size and weight; both have incredibly low "on" resistance. So why would anyone spend big bucks on the new 410-MXC when a check of the discount mail-order companies shows that the T1X's price has plummeted to around \$100? The 410-MXC has high-frequency (HF) motor switching, that's why!

Think about how an electronic speed controller (ESC) works. When

we run at half throttle, the SC is switching on and off; it's turned on half the time and off the other half. In most ESCs, this switching happens 60 times a second (60Hz is the rate at which a radio system updates the throttle and steering information), but this slow switching rate causes armature arcing and sparking, and motor heating. High-speed switching solves these problems. For the 410-MXC Novak settled on a frequency of 2,500 cycles per second (2,500Hz). This rate eliminates the possibility of arcing and sparking, which burn up armatures.

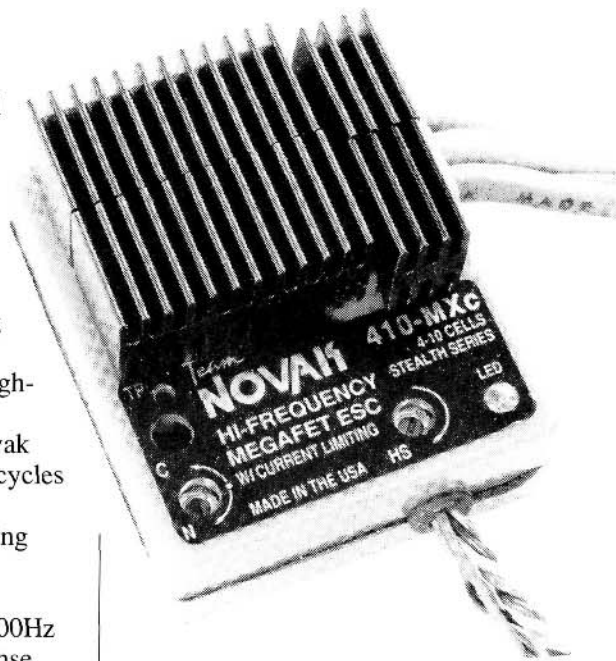
Another advantage of the 2,500Hz rate is the smooth throttle response. When your motor is turning 7,000rpm, the armature is revolving 116 times a second. If your SC's rate is 60 times a second, the motor makes

almost two revolutions in the time it takes the SC to switch. When you run a standard ESC slowly, you can hear the 60Hz growling in the motor. When the controller is running at 2,500Hz, it's now switching faster than the motor is turning. In my previous example of a motor turning at 7,000rpm, the controller switches 21 times for each revolution. This translates into smoothness. The first time you get your hands on a high-frequency (HF) controller, the precise throttle control at the slower speeds will amaze you.

The third, and perhaps the main advantage of HF is that

there's less heating of the motor. Motor inductance combined with HF greatly reduces the effect of the alternating-current (AC) component that's present in the normal motor drive circuit. The permanent magnet motors we use were designed to run on DC battery power. The AC generated by the SC's switching action can't produce any usable power in a DC motor and is wasted as motor heat. All the battery's energy is either converted to "go" energy or to heat energy; reduce the effect of the AC component, and heating will be decreased, while run times increase. A cool motor will, of course, last longer.

Remember that if you run wide open all the time (such as in high-bank, high-speed oval racing), any controller will work well for you because, at full throttle, the controller comes on hard and all switching action stops. Realistically, because of our average driving skills, most of us still get into trouble occasionally, even on a high-speed oval. The smoothness of a HF ESC is the ticket for a fast recovery from trouble.



THE "SCOPING OUT" LAB

John Rist's lab consists of:

- an oscilloscope
- a digital voltmeter
- a resistor load bank
- a 6V, 30A electricity supply
- a Pit Stop Radio servo/speed controller tester.

The oscilloscope is used to monitor the controller's output and to guarantee that it's fully on.

The digital voltmeter takes all the voltage-drop readings and verifies the reading on the current meter.

The resistor load bank consists of 40, 12-ohm, 5W power resistors, which can be switched on and off one at a time to vary the load between .6 amp and 20 amps, but the standard 12 amps are usually used.

In series with the resistors is a 25A Simpson current meter and a 1-percent .01-ohm resistor. By measuring the voltage drop across this resistor, the current meter's reading can be double-checked. Of course, the lab power supply provides the test current.

EDITORIAL OPPORTUNITY

THIS MONTH'S VICTIM

High-frequency control looks good on paper, so I decided to test the new Novak 410-MXc HF controller. It's a forward-only-with-brake controller (no reverse). Twelve of its 14 FETs are connected in parallel to provide incredibly low "on" resistance. Its bright orange case isn't waterproof, but there's a rubber gasket between its halves and a set of rubber plugs for the adjustment holes. With the rubber plugs installed, the 410-MXc should be able to withstand the mud and sand of off-road racing, but I'd avoid running through a deadly, water-filled mud hole. All this adds up to a super-looking ESC with these features:

- 14 FETs: 12 for forward and two for brakes
- adjustable current limiter
- case that's sealed against moisture and dirt
- high-frequency output that provides ultra-smooth driving, increases armature life, lengthens run times, and makes the motor run more coolly
- built-in BEC
- space-age, custom, integrated circuits

The unit comes with an instruction book, a screwdriver, filter caps, a Novak input plug system, Deans Power Plugs, mounting tape and a hot set of decals.

I always start by looking inside. (In this case, I just had to remove two screws.) Novak has jumped into the 21st century with this controller! Inside the case I found, not one, but two printed-circuit (PC) boards with the components mounted on their surfaces. This means that the parts' leads don't go through the board, but are lap-soldered to the board's surface. This allows parts to be mounted on both sides of the board.

(Continued on page 76)

Air Age Publishing, Inc., publisher of *R/C Car Action* and other hobby-related publications, is looking for a creative, self-motivated individual who is interested in a magazine career. You will work on *R/C Car Action* and related special publications and books.

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SCOPING OUT

The two PC boards are stacked and interconnected by a network of riser wires. Novak has crammed a lot of new functions into a case that's the same size as the older T1X, and they still managed to make it weigh less!

This controller passed the appearance test, but would it pass my lab tests? To answer this question, I headed to the "Scoping Out" lab (see sidebar).

TESTING RESISTANCE

I always run the resistance test twice. First, I determine the SC's resistance with the entire length of the motor and battery wires supplied by the factory; then I determine its resistance with only 2 inches of battery leads and motor leads. This gives standard readings that allow me to compare controllers.

With 12 amps of current flowing through the unit, I measured a 0.06V drop, from which I calculated a resistance of 0.005 ohm. The voltage drop at the 2-inch point was .04 volt—a very low resistance of 0.003 ohm. *Wow!* I quickly checked my past articles and confirmed that this is the lowest 2-inch-point resistance reading ever.

"LET-IT-COOK" TEST

For this test, I switched in all the load resistors to bring the current up to 21 amps. With the heat sinks installed, but without any air cooling, I let the controller cook for 30 minutes, after which I found the heat sinks only slightly warm. Considering this SC's incredibly low resistance, this wasn't surprising.

DEAD-SHORT TEST

This test is designed to test the efficiency of thermal shut-down. My shorting device is a piece of monster wire with an alligator clip on each end. With the monster wire in place, the current jumped to 40 amps, and I waited 5 minutes for thermal shut-down. The 410-MXc never complained. The heat sinks were quite warm, but nowhere near hot enough to cause shut-down. Admittedly, a shorted Ni-Cd will deliver more than 100 amps, but 40 amps is a realistic test because most malfunctions, e.g., a

NOVAK 410-MXC

DIMENSIONS:		TEST PARAMETERS:	
Height (with heat sink)	0.75 inch	Min Voltage	4 cells
Width	1.78 inches	Max Current Forward	Unlisted
Length	1.69 inches	Continuous-Current Forward	500 amps
Weight (with wires)	3.0 ounces	Resistance	0.0015 ohm
TUNING:		TEST RESULTS:	
Access to Controls	Excellent	Voltage	6 volts
Ease of Adjustment	Very good	Current	12 amps
PRICE:		TEST RESULTS:	
Sug. Retail Price	\$200	Voltage Drop to end of wires	0.06 volt
Warranty	90 days	Voltage Drop at 2-inch point	0.04 volt
ELECTRICAL:		BEC Output, 6-cell battery	5.67 volts
(Manufacturer's Specs)		Resistance to end of wires*	0.005 ohm
Max Voltage	10 cells	Resistance at 2-inch point*	0.003 ohm
		*Resistance=Voltage Drop/Amps	
COMMENTS:			
The 410-MXc is destined to become the new king of speed controllers. It could claim this title on its low resistance alone, but with the advantage of high-frequency motor drive, this controller is nothing short of spectacular. The 410-MXc output frequency switches at 2500Hz instead of the 60Hz found in most controllers. This HF output reduces armature wear, increases run times, reduces motor heating and provides smoothness and control in the lower throttle ranges. The 410-MXc passed the lab test without working up a sweat; in fact, it registered one of the lowest "on" resistances ever. With its 14 FETs, the 410-MXc is a little larger than most speed controllers, but it's this 14-FET arrangement that provides its awesome power. This controller is bound to find its way into the winners' circle at many major races.			

jammed motor, don't provide a true dead short.

When dealing with high-power electric motors powered by Ni-Cds, use a little common sense when you have trouble. If your car is running poorly, get off the throttle and find the cause of the trouble. If you insist on holding the pedal to the metal, you'll have to buy a new motor almost every time. An ESC that can stand 40 amps for 5 minutes is probably bulletproof and won't die as a result of a jammed gear or a burnt-out motor.

The 410-MXc passed the lab tests without even working up a sweat; in fact, it registered one of the lowest "on" resistances ever. I was itching to install this jewel in a car to see whether it would behave as well as it had on the test bench, and I was itching to try a HF controller. Would HF *really* make a difference to the car's "driveability"?

CAR TESTS

Before installing an ESC, you should always read the instruction book, and

this is especially true of the 410-MXc. Some of its features are unlike anything we've seen before. I noticed a 2-inch red wire sticking out, but the instructions didn't seem to say what it was for, so I called Novak. It's the 5.7V supply line used to power the KO-style servo that needs an external power supply. The Novak representative also told me that this feature is explained in a sheet labeled, "*READ THIS FIRST*"! As always, our questions will be answered if we read *all* the instructions.

The sheet I had ignored contained two major points:

- First, the positions of the ESC and the receiver, and the use of the 3.1-microfarad capacitors are very important because a HF controller generates more electrical noise than a standard one. If you want to avoid glitching, read and heed the information on component locations, and don't forget the 3.1-microfarad capacitors.
- Second, because the 410-MXc is different from other Novak controllers

it's important to "READ AND FOLLOW ALL INSTRUCTIONS"—good advice! Thousands of controllers are destroyed each year by modelers who ignore the warnings given in their instructions—things like "Avoid non-polarized connectors."

Because it was cold and wet outside, I decided to mount the 410-MXc in my Bolink Eliminator pan car. The proliferation of indoor carpet tracks all over the country has given a tremendous boost to year-round racing.

In the Eliminator, the receiver should be in front of a centrally located antenna, and the speed controller should be just aft of the antenna. This was in keeping with Novak's recommendation that there should be a 2-inch space between the antenna/receiver combination and all the wiring for the motor, the SC and the servo. With 14 FETs, the 410-MXc is fairly large, but it fit nicely into the available space. With everything set up, I headed to the carpet track at Sunbelt RC Hobbies.

The HF was immediately apparent in the SC's smoothness. The car fairly *flew* around the track! Throttle smoothness at lower speeds made it easy to get the car going after it tangled with a wall, and when I checked after the first two runs, the 410-MXc was barely warm. This cool running is important because the hotter a controller gets, the higher its resistance becomes. What's *most* amazing is that the motor seemed to be running more coolly than normal. This is great, because any time you reduce motor heat, run times will increase (they were better than with conventional controllers), and the motor will last much longer.

DISASTER STRIKES!

During the third run, the car stopped, and I found that one of the brushes was stuck in the brush hood. I corrected this, but that didn't get the car running. The 410-MXc had quit working! I sent it back to Novak with a detailed account of what it had been through, and in a few days, Novak returned it with a note saying that one of the FETs had shorted and caused



Compromise No More

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Opto-coupling eliminates any direct connection between the radio circuit and the motor circuit. Motor noise can't get back into your radio receiver and cause glitching.

Hi-Frequency Switching

Hi-Frequency switching is much more efficient than frame rate switching, especially at lower throttle settings. Motor heating is greatly reduced, motor runs are noticeably longer, and throttle response is extremely linear.

Signal Filtering

A special triple pole low pass filter in the decoder circuit produces a very smooth and precise speed command. Try it once and you will never want to return to the spastic control you live with now.

16 Amp Shotky Diode

This massive flyback diode greatly reduces switching losses during partial throttle operation. The control runs much cooler and more efficiently and your nicads run longer.

Three Custom Designs

MODEL 205 is designed for Monster Trucks. It features a soft start and soft brake for smooth precise handling.

MODEL 206 is designed for Drag Racing.

It has a hair trigger for low E.T. and a soft brake for smooth safe stops.

MODEL 207 is designed for Racing Boats.

It is water proof and has a soft start, but of course it has no Brakes.

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I designed our new Team Astro Hi-Rate Speed Controls with No Compromises. I gave them all the features that serious electric racers have been asking for. I hope you like them.

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(Continued on page 86)

TRACK REPORT

by JOHN HUBER



I FIRST SAW an **Associated*** Superspeedway 10L (SS 10L) at the Thunderdrome in California, and I was very impressed by the **scale appearance** of its narrow body.

According to Associated, the 1/10-scale cars that we've been using for the past few years aren't true to scale. Cars were made wider to increase their turning ability on roadcourses, but on a track such as the Thunderdrome, **stability** is more crucial, and narrow (or "less square") cars handle better.

A **narrow** body also has much less frontal area, so there's less drag. This enables the car to go faster. Associated's Superspeedway **10L** is just the ticket for today's high-speed ovals.

SPEEDWAY SOLUTION

When I received the new 10L, it was just starting to get really cold here in the Northeast—the perfect time to begin racing indoors again. I eagerly took the kit home and built it in one night. Its design is basically identical to that of the standard 10L, but there are a few modifications.

First, there's a new bumper, which has mounting holes of the same diameter as those on the standard 10L, so it will fit either model. The chassis is $\frac{3}{4}$ inch narrower in the front, and there's a hole in the cross-brace for a third front body mount. This is a nice feature, because an extra mount stiffens the front of the body and prevents cracking at the front wheel wells.

PERFECT POD

The rear end has a few more changes. The aluminum post that helps to control rear side-to-side damping has been a problem on the 10L, because it can bend if it's hit hard. Associated has solved this defect on the SS 10L: two shorter tubes are threaded together with a graphite brace between them. This brace is then bolted to the chassis with the nerf bars.

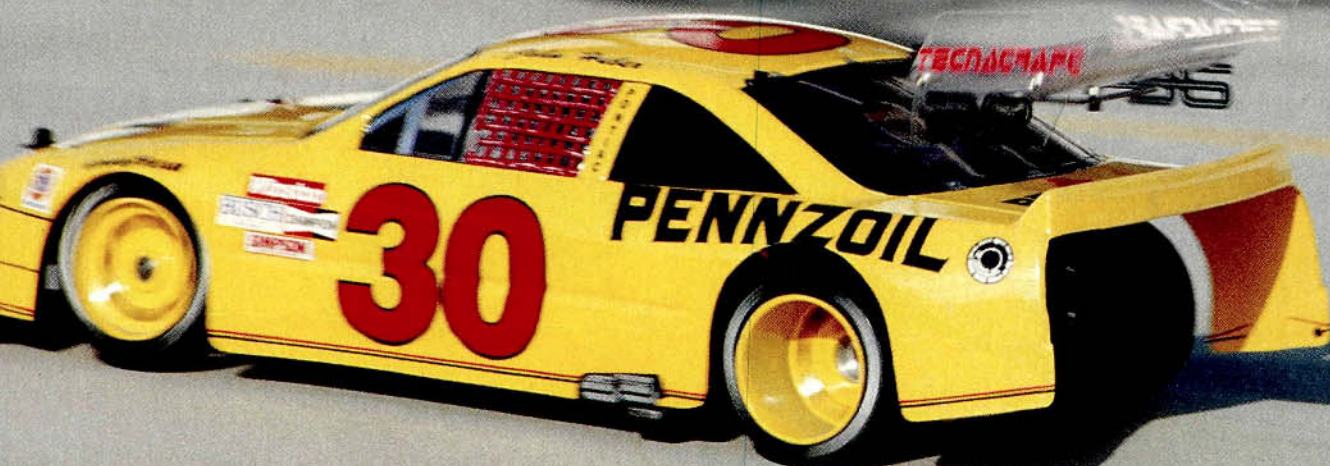
This design stiffens the rear of the chassis and reinforces the damper post. The graphite brace is $\frac{3}{4}$ inch above the chassis and provides a perfect place on which to mount the rear body mounts. By mounting



A S S O C I A T E D

Superspeedway

TOL



SUPERSPEEDWAY 10L

Slip is non-existent because the diff rings are designed to be set tight.

the body mounts higher, you can use the stiffer, lower part of them to eliminate body wobble.

The rear pod is very similar to a 12L rear pod, with a mount for a shock absorber. The thrust bearings and washers have been replaced by aluminum cone spacers. These cause less drag than thrust bearings, but they also put more load on the bearings and cause them to wear sooner. The diff side hub is shorter than that of the 10L, but I didn't notice it. I substituted a pair of T&A* hubs, but the diff side was much too wide. I put the stock hubs back in, and everything lined up correctly.

DIFFERENT DIFF

On a recent trip to the hobby shop, I asked the same question as I always do, "What's new?" I rarely find anything exciting, but this time, I saw Bud's* new ceramic diff rings. These rings have a surface that's as smooth as glass—literally!—so a pinned hub is mandatory (the rings are notched). The reverse side is textured and can't be used.

There's one problem with these rings: they're approximately .025 inch thicker than other diff rings. Although I was able to get the diff nut

onto the axle, there wasn't much thread to spare. The spur gear didn't ride fully on the raised part of the axle anymore, either, and this could cause problems.

To remedy this, I recommend that you have the raised part of the hub removed by a machine shop and then replace it with a $\frac{1}{4} \times \frac{3}{8}$ -inch non-flanged bearing. If you want to commit yourself to using these diff rings forever (as I did), remove .025 inch from the axle hub where the ring sits and .025 from the wheel hub. Is this worth it? Yes! I've run approximately 20 races with the same rings, and the diff action is still silky smooth. Slip is non-existent

because these rings are designed to be set tight.

BODACIOUS BODIES

Even though the Superspeedway car is new, there are already a number of bodies from which to choose. New from Associated are the Chevy Lumina and the Ford Thunderbird, which are both beautifully detailed and very realistic. Andy's R/C Products* offers an Olds Cutlass and a Pontiac Grand Prix, which are hot off the mold. How hot?—two days ago, the mold wasn't ready, and today I have a fully painted body and am ready to roll!

ASSOCIATED SUPERSPEEDWAY 10L

Type On-road
Scale 1/10
Sug. Retail Price \$235

DIMENSIONS:
Width 8.4 inches
Wheelbase 10.25 inches
Front Track 6.25 inches
Rear Track 5.80 inches

WEIGHT:
Gross (w/battery) ... 2 pounds, 12.41 ounces

BODY:
Type Not included

CHASSIS:
Type Pan
Material Graphite

DRIVE TRAIN:
Primary Gear
Transmission None
Differential Ball
Bearings/Bushings Ball bearings

SUSPENSION:
Front: Type Suspension arms
Damping Coil spring
Rear: Type T-plate
Damping Oil-filled,
coil-over/pressure plates

WHEELS:
Front: Type One-piece nylon
Dimensions (DxW) 1.8x1.125
inches

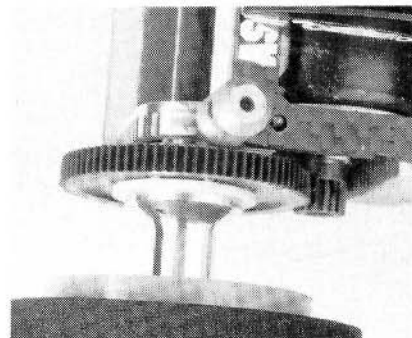
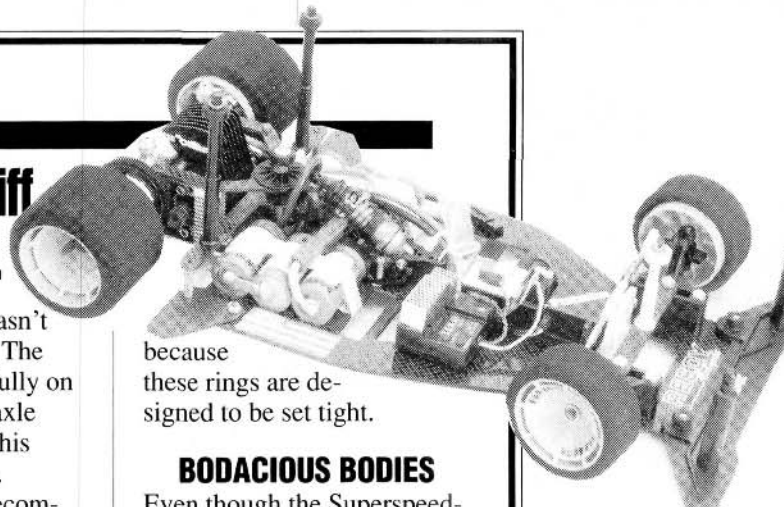
Rear: Type One-piece nylon
Dimensions (DxW) 1.8x2 inches

TIRES:
Front/Rear Green-dot foam

ELECTRICS:
Motor Not included
Battery Not included
Speed Controller Not included

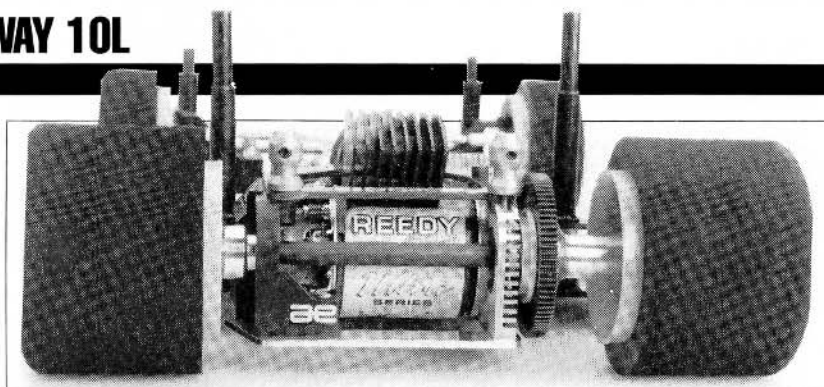
OPTIONS AS TESTED:
Futaba 3PB PCM radio and S135 servo; Tekin 411P electronic speed controller; Reedy Mr. J 12-turn quad motor; Associated heat-sink motor mount; Holeshott Racing motor heat sink; Team Bruckner matched Sanyo SCEs; Bud's ceramic diff rings; Paragon Positrac tires.

COMMENTS:
I had heard stories about how the Superspeedway 10L's narrower design would make it more difficult to drive, but this couldn't be further from the truth! At full speed, the car was much more stable than the original 10L, and its narrow body looks much more realistic than its "square" predecessor.



I had the original hub and axle machined and pinned to accept the thicker Bud's Racing ceramic diff rings.

SUPERSPEEDWAY 10L



The Superspeedway's rear pod is narrow, like that of the 12L. Note the Associated heat-sink motor plate. The Reedy Mr. J's Ultra Series motor is cooled by a Holeshot Super Cooler 2000.

I recently saw a picture of Michael Waltrip's 1991 Winston Cup Pennzoil Pontiac and was surprised to see that its front fenders had hardly any contingency sponsor decals. Apparently, Pennzoil has paid extra to have exclusive use of the car's body panels. Using photos of the full-size car, I tried to duplicate the paint scheme. Lucky for me, Autographics* had just released a new set of Pennzoil decals.

I installed a Futaba* 3PB PCM radio and S135 servo; a Tekin* 411P electronic speed controller; a Reedy* Mr. J's Ultra Series 12-turn quad motor; an Associated heat-sink motor mount; and a Holeshot Racing* motor heat sink—the Super Cooler 2000. I also replaced the stock steering linkage with Tecnaflight* titanium Ti-Rods.

TEST-DRIVE TIME

To test the car, I headed to Hobby World in Plainville, CT—a 280-foot, carpeted, tri-oval track with a lot of banking in the turns. This was the first time I'd been to this track and I'd never driven this car before, so I had no idea what to expect. I managed to get in some

practice runs to trim the steering and throttle, but I had no idea if I would make 4 minutes.

The racing began, and I immediately noticed the car's incredible stability. It didn't wander, and I didn't have to struggle to make it go in a straight line! I had set up my SS 10L with three cells on each side of the chassis, but many of the racers (including Editor Steve Pond) ran with all six on one side. Although my car handled well, I was a couple of laps behind the leaders.

I had a problem when trying to use SCR batteries in the Modified Class. I just wasn't able to gear my car as aggressively, so it wasn't as fast as the cars with SCEs. For my first time driving the Superspeedway 10L on a new track, though, I was very happy with its performance.

The Paragon* PD Posi-Trac tires provided good traction and didn't show much wear after a day's racing. The rims on these wheels are extremely rigid, light and look very "trick." Paragon's

Ground Effects traction compound kept the tires stuck to the track for the duration of the races. I even used some on

the wheel of my radio to bring the foam "back from the dead."

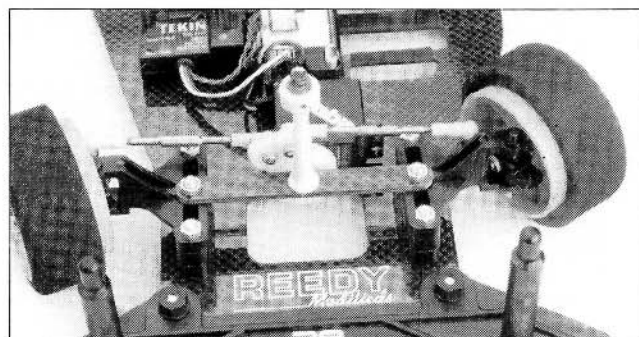
Three weeks have passed since my first test drive, and I've had more time to experiment. I switched to Team Bruckner* matched Sanyo SCE batteries and have been able to gear up considerably. (On an oval track, the throttle is pegged

to be equally threatening on smaller banked tracks and even flat ovals. The SS 10L is reportedly breaking track records on the

East Coast. By the time this report hits the stands, these cars should be on race tracks across the nation, and this could mean the start of a new trend in on-road cars!

*Here are the addresses of the companies mentioned in this article:

Associated Electrics, Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626.



The front end of the SS 10L is narrower than that of the standard 10L, but wider than the 12L's. I replaced the stock steering linkage with Tecnaflight titanium Ti-Rods.

for most of the race; this reduces the benefit of the regenerating Tekin 411P speed controller, and SCRs just won't cut it.)

The track record is held by "Mad Mike Pags," who made a blistering 44-lap run. Steve Pond won the A-Main last weekend with a 43-lap run. My best is still 41 laps, but I think that switching to six cells on the inside will help push me over that mark.

CONCLUSION

Associated designed the Superspeedway 10L for fast, banked tracks like the Thunderdrome, but it seems

T&A Precision Wheels, 2524 E. Fender, Suite D, Fullerton, CA 92631.

Bud's Racing Products, 1575 Lowell St., Elyria, OH 44035.

Andy's R/C Products, 1710 Grevelia Ct., Ontario, CA 91761.

Autographics of California, 7401 While Ln., #1, Bakersfield, CA 93309.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

Tekin Electronics, 970 Calle Negocio, San Clemente, CA 92672.

Reedy Co.; distributed by Associated Electrics.

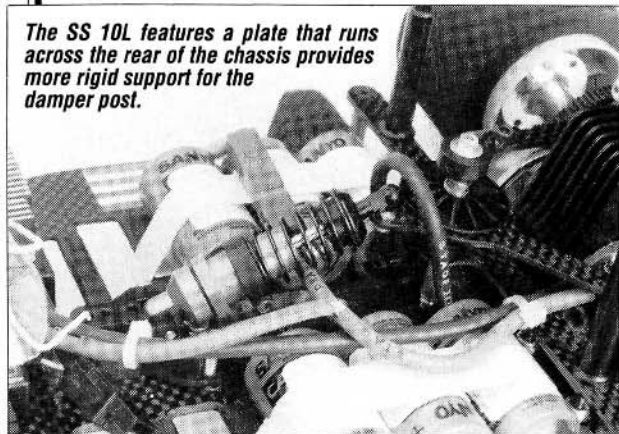
Holeshot Racing Products, P.O. Box 630, Canton, MA 02021.

Tecnaflight, 1335B Dayton St., Salinas, CA 93901.

Paragon Racing Products, 690 Industrial Circle So., Shakopee, MN 55379.

Bruckner Hobby, 2920 Bruckner Blvd., Bronx, NY 10465.

The SS 10L features a plate that runs across the rear of the chassis provides more rigid support for the damper post.



SCOPING OUT

(Continued from page 77)

the controller to turn off. They suggested that static electricity might have caused the problem.

The controller was returned just in time for me to mount it in my brand-new TRC sport pan car and just in time for the opening of a new carpet track at the RC Hobbies shop. How did the 410-MXc/TRC combination do?—many blistering runs without any problems! Whatever the cause of the earlier problem, Novak's fine repair department had quickly taken care of it; and the super "driveability" of the HF control made it easy for me to adapt to the new track.

The 410-MXc is destined to become the new king of speed controllers. It could lay claim to this title on its low resistance alone, and with the advantages of HF motor drive, it's nothing short of spectacular. It switches the drive to the motor, on and off, 2,500 times a second instead of the usual 60 times a second; its high-speed switching allows longer run times and smoother trigger response (that's best of all); it reduces wear and tear on the armature; and it allows the motor to run more coolly.

The controller is a little large for 1/12-scale cars, but it should fit most 1/10-scale cars and trucks. With its massive current-handling capacity, it should work well in monster trucks that use up to a 10-cell pack and twin monster modified motors. If your buddy—the one you've always been able to beat by a hair—shows up with a shiny new 410-MXc in his mean machine, look out! He'll be more than a hair meaner and faster!

**Here's the addresses of the company featured in this article:*

Novak Electronics, Inc., 128-C E. Dyer Rd., Santa Ana, CA 92707. ■

JUNIOR TWO

(Continued from page 49)

mance. Make sure all your connections and wiring are soldered properly, and choose your mounting locations carefully. The speed controller is best mounted on the rear shock tower.

At the last minute, I splurged and bought a Tekin mini-receiver, which fit snugly into the side chassis tray. The Futaba S132 servo that was included with my Magnum Jr. fit well under the front stiffener, and I simply attached it to the

chassis with servo tape. No servo-saver is required, because its function is integrated into the steering bellcrank, and all that's needed to connect the servo to the linkage is a standard servo horn.

Now it's time for the finishing touches. Bag G contains the body cover parts, gear cover and wing assembly. Team Losi gave my review car the radical paint job sported in the photos. Not only was the body special, but this car was also the first one off the assembly line! Lots of colorful decals are included, but be sure to use some *Car Action* decals, too!

With easy-to-adjust wing buttons and a plug-in installation, the rear wing was a breeze to install. You might want to leave your gear cover clear instead of painting it; this way, it's easier to check for dirt or debris that can damage the gears when you're racing.

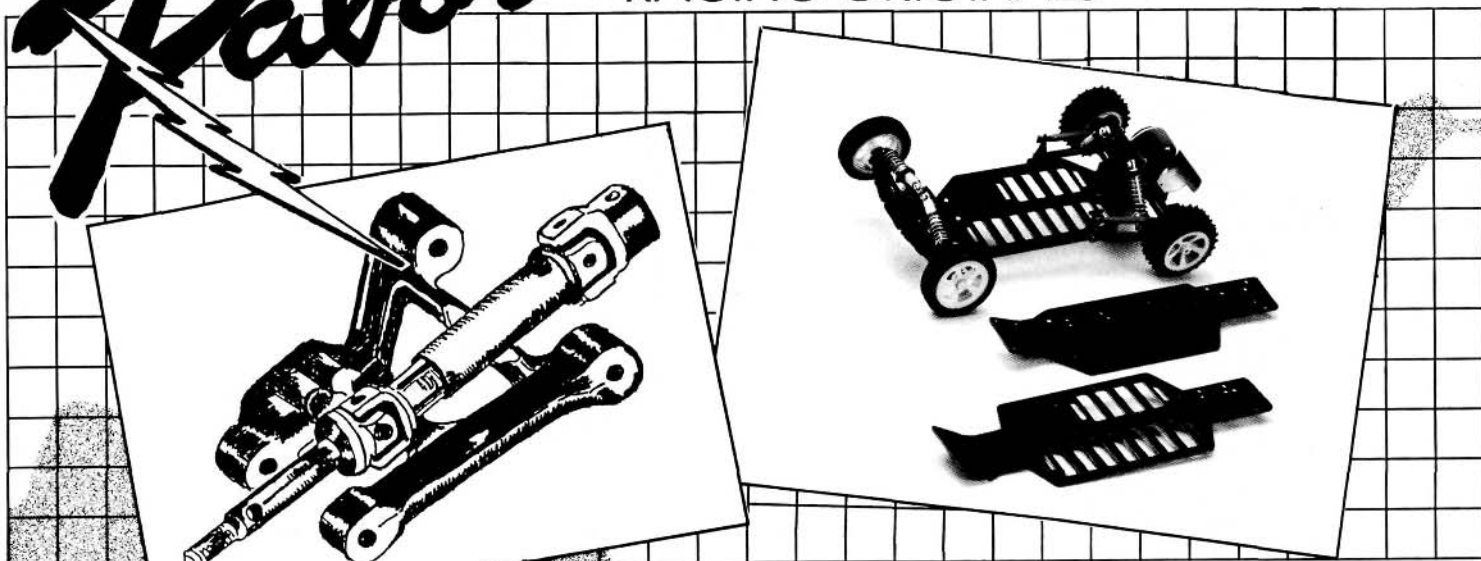
PERFORMANCE

Although its price and components make it an entry-level car, the Junior Two's handling far exceeds that of other cars in this class and price range. With a suspension that's almost identical to that of the original X2, this car really sticks to the ground. The five-link suspension might

(Continued on page 118)



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69.95	1021	JRx2 7 & 3 Oval Slotted Chassis, 30°, 1/2 Longer
59.95	1040	Ultima Lefthand Oval Chassis, 30°, 1/2 Longer
69.95	1041	Ultima 7 & 3 Oval Slotted Chassis, 30°, 1/2 Longer

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59.95	100R	500+ Pro Series SCR
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World's best R/C pilot

C H I P

by TOM ATWOOD

WHICH HIGH-STAKES R/C flying contest in 1990 was dominated by an unstoppable, 18-year-old pilot extraordinaire?—the Tenth Invitational International Tournament of Champions (TOC), held in Las Vegas, NV, from November 8 through 11. Chip Hyde walked away with \$27,500 of the \$126,500 prize money and proved he was the best R/C pilot in the world.

A CHAMP SINCE CHILDHOOD

Throughout his life, Chip has displayed a precocious brilliance in pattern competition. His early achievements include 1st-place finishes in the '82, '84, '88 and '89 U.S. Nationals. He also took 4th in the '89 World Championships and 1st in the '87 U.S. Masters. In 1988, when he was only 16 years old, Chip placed 2nd at the TOC.

In fact, by the time he was six, Chip was competing in contests and flying pattern routines with all the discipline of a seasoned pro! David Baron, a contributor to *Model Airplane News*, recounts that at that young age, Chip's ability to learn new maneuvers was incredible.

**"18-year-old
Chip Hyde wins
prestigious
Circus Circus
Hotel & Casino
Tournament of
Champions"**



H Y D E



In 1978, David was flying on a field in Southern California where Chip was flying with his father, Merle. Chip showed an interest in flying David's .60-powered Steen Skybolt biplane. He had never flown a biplane before, nor had he used a two-stick transmitter, and David says his hands barely fit over the sticks!



"It wasn't long before he was doing maneuvers like long slow rolls right over the runway." As Chip flew inverted, though, the plane's engine died (it was adjusted a little too lean), and there wasn't enough time to pass the transmitter back. Chip smoothly rolled the biplane over and set it down on the sand off the end of the runway, where it dug in and tumbled. At that point, Merle decided that it wasn't such a good idea for his son to fly other people's planes, but David notes, "It wasn't little Chip's fault. The best R/C pilot in the world couldn't have done any better!"



PHOTOS BY YAMIL SUEO

Why not
try R/C
flying?

THE CHALLENGE

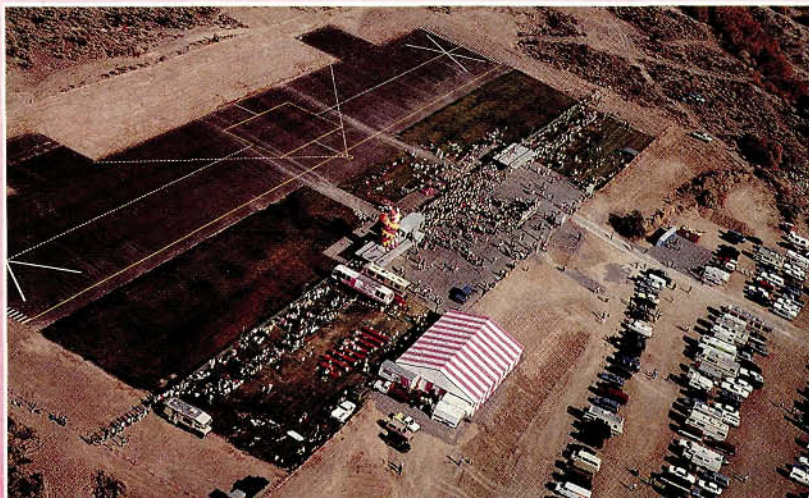
In the '70s, *Model Airplane News* (a sister publication of *R/C Car Action*) was actively involved in the TOC, which is intended to duplicate full-scale aerobatic competition as closely as possible.

Aircraft must be replicas of full-size planes that were designed for aerobatic maneuvers. The challenge is to fly predetermined aerobatic routines, as well as routines given out only the night before they're to be flown (and which can't be practiced before the competition).

In 1990, the competition was held at a large new flying field only seven miles east of the Circus Circus Hotel and Casino—the event's sponsor. Funded by William G. Bennett (Chairman of the Board of Circus Circus Enterprises, Inc.), the field offers several hundred feet of paved runway and a well-manicured, grass pit area.

Pilots are invited to the TOC based on their record of winning national and international

R/C aerobatic flying contests. To read the competitors' biographies in the TOC program book is to review the greatest achievements in R/C aerobatic competition! Twenty-one pilots



competed in last year's TOC with their 1/3-scale biplanes and monoplanes, and an estimated 10,000 spectators attended! The Circus Circus Hotel and Casino and all the people who put on the Tournament are to be commended for a job well done.

**CHIP GENERATED
ROARS OF
APPROVAL FROM
THE CROWD WITH
A FLAWLESS KNIFE-
EDGE VERTICAL
FIGURE-8 AND A
SNAP ROLL EVERY
180 DEGREES.**

CHIP RISES TO THE TOP

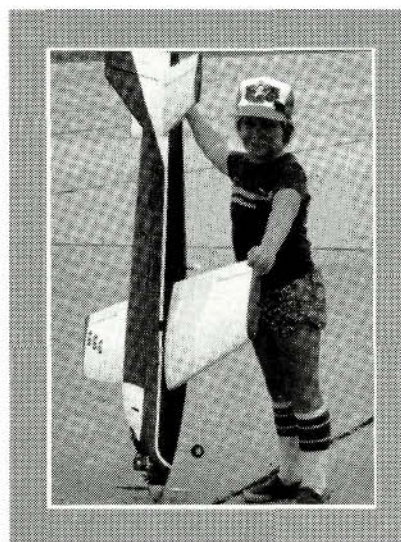
At the 1988 TOC, Austria's Hanno Prettner took 1st place by defeating 19 top-ranking pilots from nine nations. He had won a phenomenal *eight* of the nine previous TOCs! He had also been aerobatic world champion six times and was a 15-time Austrian National Champion. Everyone anticipated the battle between Hanno and rising star Chip Hyde, and they were very disappointed when, despite the arrival of his EZ Laser 200 / Skybolt, Prettner was unable to attend the tournament owing to illness.

During four days of perfect desert weather—with tem-

peratures hovering between 78 and 80 degrees and only the slightest breeze—Chip emerged as the victor. He scored near the top on the first day and prevailed thereafter; the other top fliers fought in his wake.

At the Tournament's end, these were the standings: Chip Hyde, Yuma, AZ, 1st (\$25,000); Steve Rojecki, Pensacola, FL, 2nd (\$15,000); Wolfgang Matt, Liechtenstein, 3rd (\$10,000); Steve Stricker, Baltimore, MD, 4th (\$6,000); and Bill Cunningham, Tulsa, OK, 5th (\$5,500). The top five fliers' cumulative scores differed by less than 5 percent.

(Continued on page 128)



Chip Hyde in 1978.



fire power

NO MATTER WHAT your experience with R/C cars, I guarantee that this model will simply blow you away! From the most seasoned R/C veteran to the least experienced neophyte, no one is safe when this car scorches the track. Jowls drop, eyes bug, and electrics get lonely in the pits as their owners crowd the track to glimpse this 1/8-scale, nitro-fired, mud-slinging monster—the Kyosho* Burns DX.

One-eighth-scale gas cars aren't familiar sights at R/C tracks because they're reputed to be difficult to master and prohibitively expensive. The mission of the Burns DX is to prove that 1/8-scale gas is enjoyable and affordable.



K Y O S H O

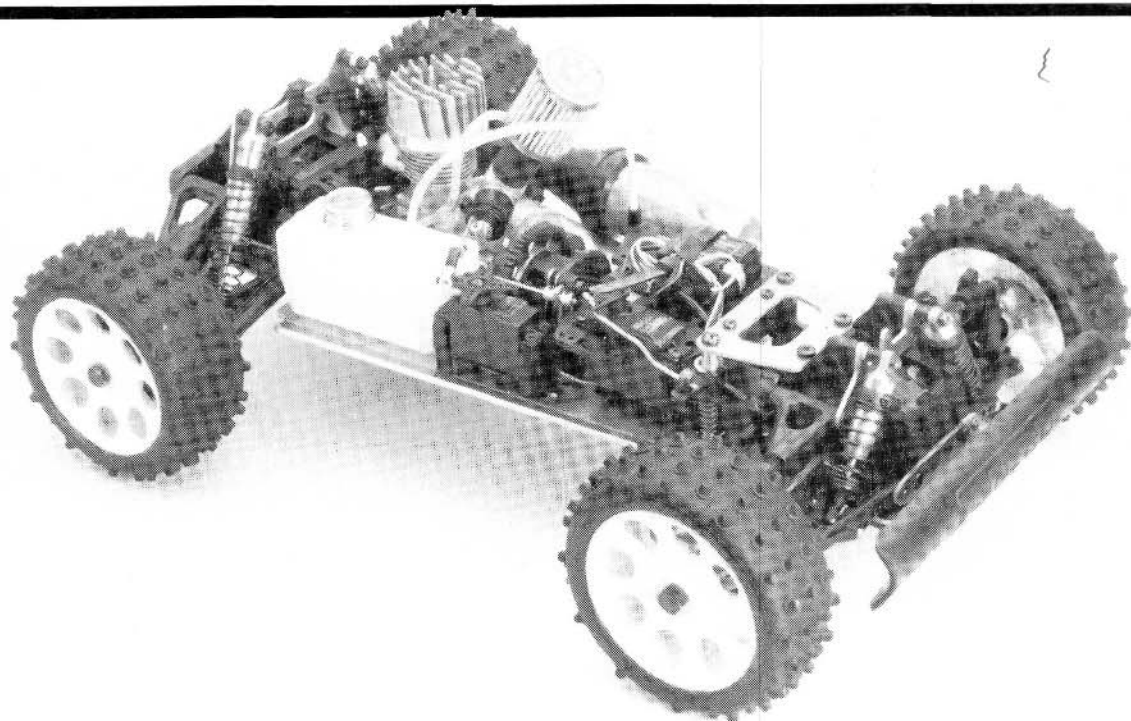
BURNS DX

b y E D B Y R O N



PHOTOS BY STEVE POND





THE BURNS IS BIG!

I noticed how different an 1/8-scale car is from a 1/10-scaler as I lifted the box. It was heavy!—approximately 7½ pounds—and, as I opened it, the large parts reminded me of the oversize Legos I had as a kid. But there was no mistaking these parts for toys; they were the high-quality components of a *serious* vehicle.

After inspecting the box's contents, I opened the manual to review the method of construction. (I admit I had heard rumors about the complexity of gas models and was a little nervous.) The Burns DX is an entry-level buggy, but it *isn't* appropriate for newcomers to R/C cars. A warning on the manual's first page informs builders of the strain a gas engine puts on a car. If you build very carefully and use liberal amounts of Loctite* thread-locking compound, you'll have a reliable vehicle; but if you build carelessly, the power of the recommended O.S.* .21 RS-B engine will shake any part loose. (Other engines will fit, but this one provides more than enough power and is easier to tune than a more powerful engine like the O.S. EX-B.)

In addition to the powerplant, you'll need a 2-channel radio (with a heavy-duty servo for the steering), an engine starter, a

glow plug and igniter, fuel (containing 10 to 20 percent nitromethane) and a receiver battery pack.

Don't economize on the radio: a high-quality unit like the Futaba* PBKA Magnum Jr. (or better) is necessary, because if the radio link to a gas-powered car is lost, it will continue to run—out of control—with potentially disastrous results. Buy an electric starter consisting of a 12V power source and a starter with a starter wheel. I made a 5-cell pack with 1000mAh, AA Ni-Cds (initially, a more expensive option than alkaline cells, but well worth it in the long run).

The list of tools required doesn't include anything unusual, and the kit contains a couple of the smaller, metric, Allen wrenches.

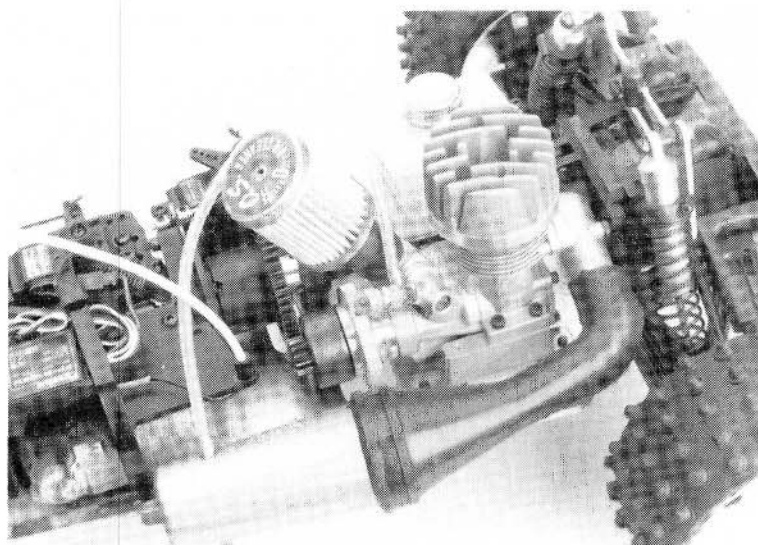
BUILDING'S A BREEZE!

I immediately realized that the size of the DX's parts would make building a breeze. The shocks are an over-size version of the famous Kyosho

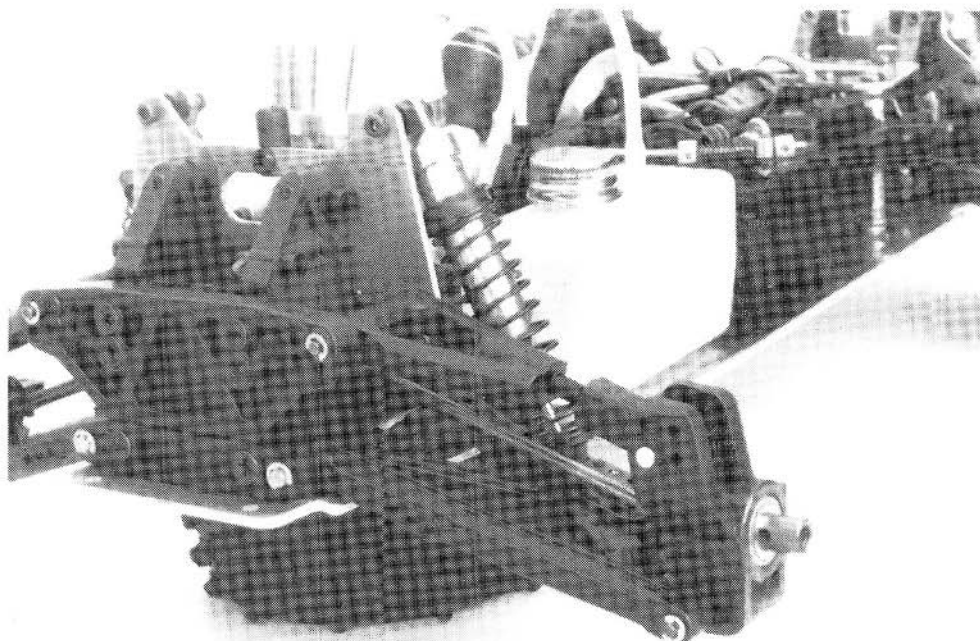
Gold shocks with longer shafts and stiffer springs. They go together very easily and are trouble-free as long as you're careful not to scratch the shaft during assembly. (Always clear all the air out of the oil before you apply the pressure diaphragm and the cap.)

● **The rear gearbox** is next in line and, as you take out the parts, you might be surprised to find that the front and rear gearboxes (including the differentials) are already assembled. Before you mount the suspension-support pieces on the gearbox, check the mesh of the drive gear and differential gear. To do this,

The reliable, easy-to-start O.S. RS-B engine provides the Burns DX with plenty of power.



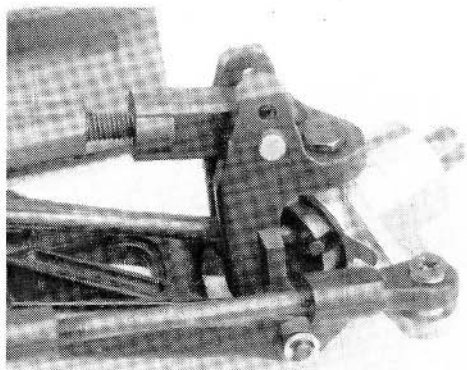
BUILDING



The beefy suspension arms can take the tremendous punishment a 1/8-scale off-road car dishes out.

spin the drive gear to make sure there's neither too much resistance nor slop. If you discover a mesh that isn't set properly, add or remove a 12x16mm shim behind the diff pinion gear, or put one between one of the diff bearings and the diff housing.

When you're satisfied with the mesh, lube the gears liberally and assemble the suspension holders. Attach the drive-gear joints using plenty of Loctite or the screw cement supplied with the kit for the set-



When the car takes a tight turn or collides with something, the front dogbones may pop out of the drive cups. Switch to the optional universal drive shafts.

screws. The instructions only specify the use of screw cement *here*, but you *must* use it on *all* metal-to-metal threads in this kit.

- **The rear suspension** goes together without a hitch. Check for free movement at each hinge point. In the lower A-arm, there's an interesting setscrew that's used to adjust the car's ground clearance. The torque rod was also new to me; it's used to connect the top of the rear gearbox to the chassis plate, and this stiffens the rear so that it can cope with the considerable torque put out by the O.S. engine. Mount the shocks, and the rear sub-assembly is complete.

- **The front suspension** is constructed in the same way as the rear, but here, you'll find one of the discrepancies between the instructions and the actual construction. The diagram shows a universal-joint swing shaft, but the kit contains a dogbone and cup to drive the front wheels. This system has an excessive amount of play, and I later found it prone to binding or spitting out the dogbone at full-lock steering. I could only avoid this by limiting steering throw—not ideal.

- **The center diff, the brake and the steering bellcranks** are installed when the front sub-assembly has been completed. Two notes on this stage: first, when you install the brake, be sure to leave 6mm between the

brake pads. If you don't, there will be too much drag on the drive train, and it will slow the DX and wear out the brake prematurely. Second, the M3x25 screws that hold the tie rods to the bellcranks are too long; put a washer or two underneath the screw head to prevent the bottom of the screw from dragging across the chassis.

- **Radio-plate** assembly requires the use of servo tape (I stacked three pieces) to hold the receiver down and to isolate it from vibration. Don't trust the tie strap to keep the receiver in place, and don't trust the receiver switch. Omit the switch, and connect the battery directly to the receiver when you're ready to run. This will avoid the chance of the switch being accidentally turned off and your losing control of the car. As already mentioned, you should replace the radio battery with a built-up Ni-Cd pack for better battery performance and safer operation.

- **The rear assembly.** The instructions note the installation of a roll bar, but don't go crazy looking for it, because it isn't included in the kit. Without a roll bar, the engine's cylinder head is the highest point on the car, and that's not good. I'd

gladly pay a couple of extra dollars for a bar to protect the engine, which represents a considerable investment.

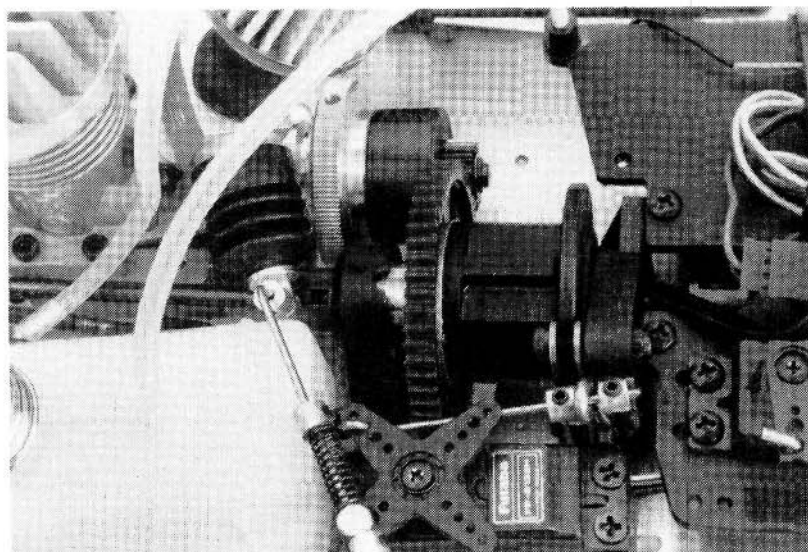
● **The front assembly** goes onto the chassis easily. Use plenty of Loctite at the tie-rod ends (this was the first screw to come loose on my car). The beefy bumper is mounted with only two screws, but these have proven to be more than adequate.

ENGINE ENERGY

On to engine installation, where a careful application of Loctite is especially necessary. Assemble the clutch first, and be sure to clean any excess Loctite off the pilot shaft and flywheel

and smaller, so it's easier to fit it under the body. I recommend that you use it. Mount the engine in the chassis; adjust the pinion and spur mesh; and mount the muffler, the tank and the servo.

Install the radio plate and hook-up the servos. Turn on the transmitter and receiver, and set the trims to neutral to center the servos. Carefully follow the instructions, and the servo linkages will go together perfectly on your first try. You might have to move the carburetor around to achieve full-throttle motion without interference from the tank or the drive shaft. Things are tight back there, but be patient, and get it right the



The DX has a center differential to distribute power properly. The disk-brake system works very well, but must be properly adjusted to avoid damage.

before you add the clutch bearing and the bell. Grease the bearing liberally, and remember to clean and relube this part regularly.

When tightening the screws for the manifold and engine mounts, be firm, but don't over-tighten them, because their threads strip easily. Attach the air cleaner to the base plate with a generous amount of Zap*, and then saturate the filter with lightweight oil to prevent dust from getting into the carburetor. The O.S. engine comes with an air cleaner, but there's also one in the kit, and it's much lighter

first time.

THE BURNS TURNS!

Glue the tires on the wheel rims, and mount them on the drive washer/hub assembly. Be careful with the 2.6x16mm pins, because they're easy to lose, and there aren't any spares. Don't over-tighten the lug nuts, or you'll jam the wheel adapters on the axle.

The car is now complete, and it's time to turn your attention to the body. Its size makes painting and detailing a breeze. When I trimmed the body, I cut out the

(Continued on page 138)

Type Off-road gas-powered 4WD buggy
Scale 1/8
Sug. Retail Price \$379.95

DIMENSIONS:

Overall Length 17.37 inches
Width 12.18 inches
Wheelbase 12.37 inches
Front Track 10.5 inches
Rear Track 10.12 inches

WEIGHT:

Gross (with battery) 7 pounds, 7 ounces

BODY:

Type Buggy
Material Polycarbonate

CHASSIS:

Type Pan
Material Aluminum

DRIVE TRAIN:

Primary Pinion/spur with centrifugal clutch
Transmission Center gear diff
Differentials Three spider gears
Bearings Ball bearings

SUSPENSION:

Type (f/r) Lower A-arm/upper link
Damping (f/r) Oil-filled, coil-over aluminum shocks

WHEELS:

Front: Type One-piece plastic
Dimensions (DxW) 3.125x1.25 inches
Rear: Type One-piece plastic
Dimensions (DxW) 3.125x1.5 inches

TIRES:

Front/Rear Blunt spike

OPTIONS AS TESTED:

Futaba Magnum Junior; O.S. RSB engine; 13-tooth clutch pinion.

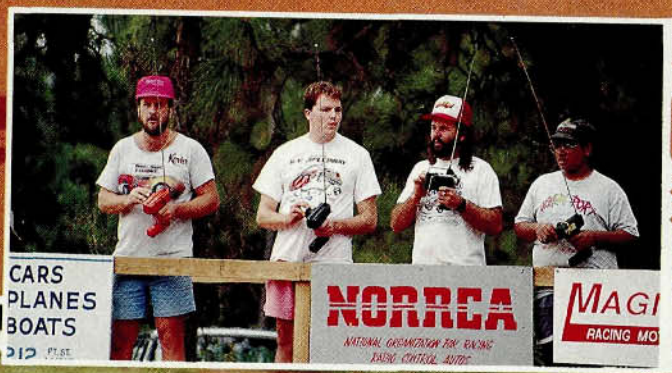
COMMENTS:

The good, the bad and the "gnarly." Detail of instructions—good; hardly a hitch. Ease of assembly—good; the size makes it easy. Almost all parts—good; fit perfectly. Durability—good; beyond my expectations. Bushings—bad; replace them with bearings. Front dogbones—bad; replace them with a U-joint shaft. Lack of roll bar—bad; get one. Kyosho BDX—a blast to own. O.S. RSB engine—gnarly!; smooth, reliable horsepower.

* not included



Blue Groovin' in the
Sunshine State!





by JIM SHEPKA

Florida Dirt Oval

STATE CHAMPS

DO YOU KNOW how nice

Florida can be in November? I'm from a part of the country where it snows early, **SO** it **wasn't** difficult for me to accept an assignment down near the 30th parallel!

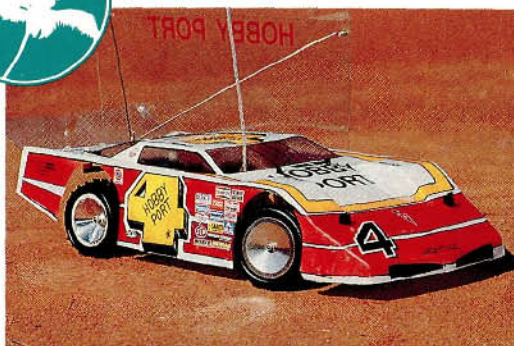
The 1990 Florida **Dirt** Oval State Championships were hosted by the Martin County Speedway in Stuart, FL, (about **35** miles north of West **Palm** Beach) and presented by **NORRCA.**

Photo: Bill A. Soto



Florida

Dirt Oval



Above left: Jim Mellons won a silver medal with his sharp-looking McAllister Concours entry.

Above right: Bob Shea's sharp Twister Stealth won the "gold" in the Concours event.

Competition was held in six classes and, with a center-line distance of nearly 280 feet in a tri-oval configuration, the red-clay track was hard, dry and very fast. Many competi-

was more suitable for mud-bog racers than the Outlaw sprinters!

Dirt-oval racers are a hardy breed, so they weren't too concerned about the condi-

tions.

Track owner Jerry Landry assured everyone that he would have the track in shape quickly (as long as no one walked on it), and

the forecast predicted sunshine by noon, so there were reasons for optimism. Although the event was scheduled to start at 9:30 a.m., NORRCA President J.R. Sitman called for a 2-hour delay, and this gave the drivers time to prepare for the

changed conditions. To my surprise, the track really did come around as predicted (hey, what do I know?!).

THE CONOURS AND QUALIFYING

There were several sharp entries in the Concours event, which was held before the first racing heat. Bob Shea took top honors with a really sharp Twister Stealth paint scheme. Jim Mellons ran a close 2nd with his eye-catching neon McAllister body, and Andrea Whipkey took the bronze slot with her finely detailed All-American Big Boy sprinter. With the pre-race formalities and the drivers' meeting out of the way, it was time to get sideways!

Three qualifying rounds were scheduled for Saturday. The Stock Class drivers used Race Prep handouts, and Art Wilson took an early lead with a fine 27-lap run in the



Left: As this young driver discovered, the mud was as much a problem for the racers as it was for the cars.

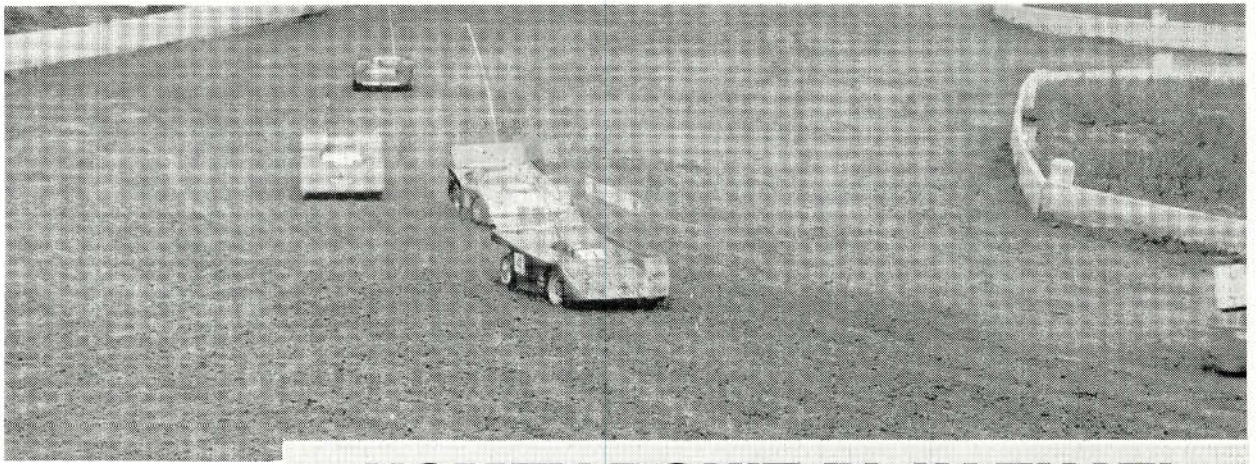
tors arrived early to try to hit on that "all-important" motor/tire combination, but all their work was for naught because Friday night brought rain. Although the storm was over by early Saturday morning, the track

2WD STOCK

FIN.	QUAL.	DRIVER	CHASSIS	SC	BATTERIES	MOTOR	TIRES F/R	BODY
1	2	Kevin Mandeville	RC10	Tekin 411	PTI	Handout	Losi	Stealth Wedge
2	5	Mike Dispenza Jr.	Ultima	Tekin Pro	Trinity		Losi/Schumacher	Premier Design Corvette
3	3	Paul Schaub	RC10	Novak	Fasttracks		Losi/Andy's	N/A
4	1	Art Wilson	RC10	Novak 410	PTI		Schumacher	Bolink Devastator
5	4	Bill Davis	Andy's	Novak T1-X	Super Golds		Schumacher	McAllister
6	9	Paul Fazio	JR-X2	Novak T1-X	Punched		Stock	N/A
7	8	Troy Desmarais	RC10	Novak	N/A		Losi/Schumacher	Custom Works Wedge
8	7	Gary Gallagher	RC10	Robart 505	Power Pushed		Imex/Losi	JG T-Bird
9	10	Cam Crawford	Houge	Novak	Team Smooth		Losi	N/A
10	6	Will Cordelo	Hot Trick	Tekin	PTI		CRP/Losi	Rocket Wedge

NOVICE

FIN.	QUAL.	DRIVER	CHASSIS	SC	BATTERIES	MOTOR	TIRES F/R	BODY
1	2	Skipper Sjobeck	RC10	Novak T1-X	Trinity	Handout	Losi	Lumina Wedge
2	5	Aaron Figler	RC10	Novak T-4	Kyosho		Losi/Trinity	Open Comp. Camaro
3	3	Matthew Parsons	RC10	Traxxas	N/A		Pro-Line	Premier Bat Wedge
4	6	Mike Madigan	Frog	Stock	N/A		Stock	N/A
5	1	Kenny Davis	RC10	Novak T-4	N/A		Losi	McAllister Wedge
6	4	Michael Craig	RC10	Tekin	PTI		Imex	Lumina Wedge



first round. Bill Davis and Kevin Mandeville were the only other Stock racers to break into that range. The track was still quite muddy in places, and it was hard for the drivers to get any power. Every lap moved more damp clay to the outside of the tracks and created quite a few racing lines.

With the berm well established, the sprint cars were really a kick to watch: mud was tossed in every direction, so the cars seemed very realistic. With the only 29-lap run in the first round, Steve Minea of Team Pit Stop took an early lead for the TQ honors. Many drivers were baffled by the track's condition, so their lap times differed greatly. Several drivers turned in good times in the 2WD Open, so it was slightly more competitive. Cliff Guest held

HOMIEY DON'T PLAY THAT!

I heard some things that really burned me up. I know you shouldn't put much faith in rumors, but when you hear them from enough people, they're worth talking about. It seems that another area club had spread negative rumors about this event: that the entry fees had been jacked-up; that the track had environmental problems; that the event was being held at a different track on a different weekend—even that it wasn't being held at all! Is this the kind of behavior we want in R/C car racing? I don't think so, and I don't think it should be tolerated!

Problems between rival clubs, hobby shops, or local racers should be addressed. If you have a problem or aren't sure about what's going on, pick up the phone, call the track and find out what's happening. Consider all the hard work that goes into staging an event before you decide not to attend because someone is upset and has spread nasty rumors. Just for the record, the entry fee was the same as that given on the entry form; the race was held on Veterans' Day weekend at the Martin County R/C Speedway; mosquitoes were never a problem; and I had one heck of time!

OPEN TRUCK

FIN.	QUAL.	DRIVER	CHASSIS	SC	BATTERIES	MOTOR	TIRES F/R	BODY
1	2	Steve Minea	TPS Nova	Tekin 411	King R/C	Team Pit 14/5	Pro-Line/Trinity	Andy's Chevy Truck Stop
2	1	James Terry	A&L	Novak T1-X	PTI	Phoenix	Losi/Parma	Losi Toyota
3	5	David Secunda	JRX-T	Tekin 700	Gonzo	Phoenix 18/2	Losi	Stock
4	8	Cam Crawford	Houge	Novak	Team Smooth	Speedworks	Trinity	N/A
5	3	Bob Whipkey	JRX-T	Novak T1-X	Gonzo	Phoenix	TMS/Losi	Stock
6	7	Mark Wright	RC10	Tekin 610	N/A	Fantom 15/2	Losi/Trinity	Pro-Line Chevy
7	9	Mike Dispenza Jr.	Ultima	Novak T-4	N/A	Fantom 15/2	Trinity	Sportside Chevy
8	10	Sean Hurley	RC10	Novak T-4	Composite	Reedy 16/2	Losi	N/A
9	6	Joe Boufiglio	JRX-T	Tekin	N/A	Team Pit Stop	Losi	Stock
10	4	Jerry Schindler	Hulk	Novak T1-X	Gonzo	Phoenix 18/2	Losi	Hulk 6

2WD OPEN

FIN.	QUAL.	DRIVER	CHASSIS	SC	BATTERIES	MOTOR	TIRES F/R	BODY
1	2	Tem Raskin	Scratch	Novak T1-X	Super Cell	Magnum 14/2	Losi	Andy's Corvette
2	1	Paul Schaub	RC10	Novak	Fasttracks	QuarterFlash	Losi	Andy's
3	5	Steve Minea	TPS	Tekin	Pac Shop	TPS 13/2	Schumacher/Losi	Premier Design Nova Oval
4	6	Cliff Guest	RC10	Novak T1-X	Team Smooth	Twister	Losi	Andy's Wedge Eric's Express
5	9	Kevin Mandeville	N/A	Tekin 411	PTI	Fantom 13/2	Losi	Stealth Wedge
6	10	Paul Fazio	JR-X2	Novak T1-X	N/A	Twister	N/A	N/A
7	7	Wesley Powell	N/A	Novak T-4	N/A	Reedy 13/3	Losi	Twister Vortex Wedge
8	8	Jim Mellons	RC10	Novak T-4	Trinity	Trinity 15/2	Losi	McAllister
9	3	Art Wilson	RC10	Novak 410	PTI	Fantom	Schumacher	Bolink Devastator
10	4	Jim Shea	RC10	Novak	Fasttracks	Magnum	Losi	Andy's

Florida

Dirt Oval



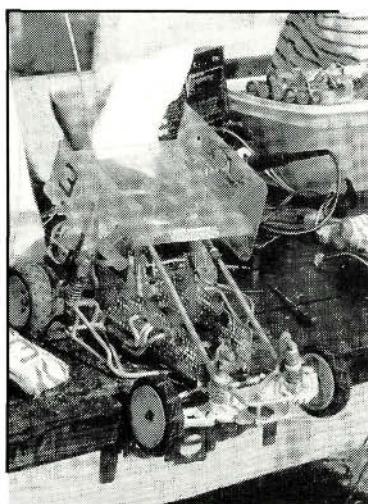
an early 1 1/2-lap advantage over the rest of the field with a solid 30/4:09.56 run. Wesley Powell, Paul Schaub and Art Wilson all turned in 29-lap times that were only seconds apart.

Jim Terry took the top spot in the first-round of the Open Truck Class with a solid 27-lap run. With their huge tires and raw horsepower, the trucks really flung the mud, and the crowd was enthusiastic.

The super-ballistic 4WD Open cars were next out of the box. They were somewhat hampered by the track conditions, and their lap times



Left: This "blind stare" was common in the pits. The drivers had to work hard to dial-in their cars for the ever-changing track conditions.



Don Mulavaney's "Swiss-cheese" version of a sprint car shows what some drivers will do to lean-out their cars.

dropped off near the end of the runs. Jim Shea, however, took no prisoners! He destroyed the field with an awesome 32-lap run. His closest competitor, Gary Fulp, was nearly three laps behind!

The Novice Class was for first-time racers, and it attracted a small (literally—the tallest driver could barely see over the railing on the drivers' stand!) yet highly competitive field. Kenny Davis took the early honors with an aggressive 23-lap run, followed closely by Matthew Parsons, Mike Madigan and Aaron Figler.

the changing track conditions and the incredible amount of clay that accumulated on their chassis. (One driver's car weighed a robust 6 pounds after his heat; it's hard to factor 3 pounds of clay into any gear chart!) Lap times were well below those of the previous day's practice session but, when the sun broke through and offered some relief, there was still hope for a fast track. Everyone was in the same boat, and many drivers managed some respectable lap times.

In the second rounds, qualifying times were better because the track conditions had improved. In the 2WD Open, Paul Schaub upped the ante; he was the first driver to hit 31 laps. Tem Raskin got it together and turned in the second fastest run of the day with a 30/4:02.09. Art Wilson and Jim Shea also hit the 30-lap level. In the Open Truck Class, only one of the top five drivers was able to pick up any time. Bob Whipkey turned in a 26-lap run, which was still only good enough for the third spot.

Tem Raskin found the conditions to his liking. He found the right setup, turned in an ultra-fast 34 4:07.69 (at a scale-speed of 280.7

SECOND TIME AROUND...

The drivers continued to cope with

4WD OPEN

FIN.	QUAL.	DRIVER	CHASSIS	SC	BATTERIES	MOTOR	TIRES F/R	BODY
1	1	Tem Raskin	Dominator	Novak T1-X	Super Cell	Magnum 13/1	Custom Works	Custom Works Wedge
2	3	Gary Fulp	SRP	Novak 1	Team Smooth	TPS 15/3	N/A	SRP Corvette
3	5	Justin McNeal	Dominator	Novak T1-X	Gonzo	TPS	CKW	Andy's
4	2	Jim Shea	Dominator	Novak	Fasttracks	Magnum	Custom Works	Stealth Wedge
5	6	Bob Shea	SRP	Tekin	Fasttracks	QuarterFlash	Custom Works	Twister Stealth 12/2
6	4	Pete Jackson	Dominator	Novak	Gonzo	Phoenix	CKW	Custom Works Wedge

OUTLAW SPRINT

FIN.	QUAL.	DRIVER	CHASSIS	SC	BATTERIES	MOTOR	TIRES F/R	BODY
1	1	Steve Minea	TPS Nova	Tekin 411	King R/C	TPS 13/1	Schumacher/Losi	Premier Design Sprint
2	8	Russell Smith	Challenger	Novak T1-X	Team Smooth	TPS	Schumacher	Big Boy Lightning
3	2	Bill Davis	Big Boy	Novak T1-X	Team Smooth	Peak	Trinity	Big Boy Performance
4	4	J.R. Sitman	Big Boy	Novak T1-X	Revtech	Revtech 14	Losi	McAllister
5	7	John Grubb	RC10	Novak	Fasttracks	Strike Force	Losi	Bolink
6	10	Pete Jackson	Big Boy	Novak	Gonzo	Phoenix	Losi	Big Boy
7	3	Jerry Schindler	JR-X2	Novak T-4	Gonzo	Phoenix 18/2	Losi	N/A
8	3	Kevin McAninch	RCRC	Novak T-4	Team Smooth	Revtech 17/3	Losi	Big Boy
9	6	Don Thompson	Big Boy	Tekin	Atomic	Trinity 15/2	Losi	N/A
10	5	Jamie Fisher	Big Boy	Novak T-4	Gonzo	TPS 15/2	Losi	Big Boy

mph!) and was TQ for the event! Jim Shea showed that he wasn't a slouch by turning in a time that was just less than one lap off the pace. The Novice Class finally got a handle on the surface, and Kenny Davis still led the pace with a fine 26-lap pace. The drivers picked up an average of two laps over their previous efforts.

As more and more laps were run, the muddy conditions of the earlier heats were no longer of concern. Cars that had plowed along like snow blowers in a Nor'easter found that the track's surface was more accommodating. Most of the cars in the 2WD Open Class were faster. Art Wilson again led the field with a 29/4:06.09 run, but there were at least 10 cars within striking distance.

The Outlaw Sprinters, on the other hand, went in the opposite direction! Of the top 10 qualifiers, only J.R. Sitman was able to gain any ground. A 27-lap run with his Big Boy chassis moved him up to the 4th spot.

These drivers seemed to be able to get around the turns better in the muddy conditions. (Rumor had it that the sprinkler system was set to go off right before their next heat!)

FINAL QUALIFIERS

Ruts started to appear in the track, so a time-out was called to prep it for the final rounds. The racers appreciated the extra time to dial-in their cars. With the track in perfect condition (at least, I thought so), I antici-

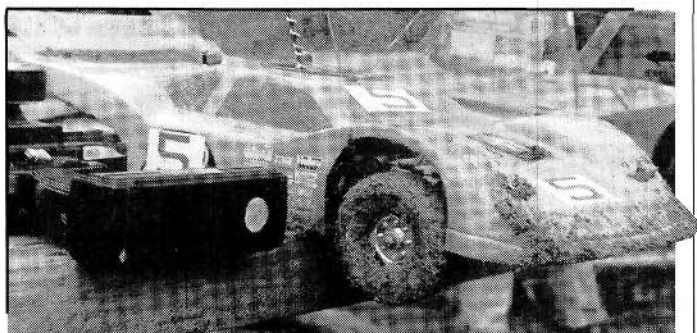


Team Hobby Port mascot Josephine Cool soaks up the bright Florida rays.

pated some fast times, but—say it ain't so!—not one TQ time came out of this round! The drivers liked the track, but no one could find the right combination. The conditions had changed for the third consecutive round, and many drivers returned to their hotel rooms

scratching their heads.

Sunday morning's final qualifying rounds were greeted by bright sunshine and comfortable temperatures. The track was in great shape and so were the competitors' attitudes. In the 2WD Stock Class, Kevin Mandeville turned in his best effort and just missed TQ by less than a second. Paul Schaub and Mike Dispenza also found the conditions to their liking as



Because of heavy rain early in the event, the track was moist, but the drivers couldn't understand why running for 4 minutes was such a problem. (Picking up 3 or more pounds of clay during a race might have had something to do with it!)

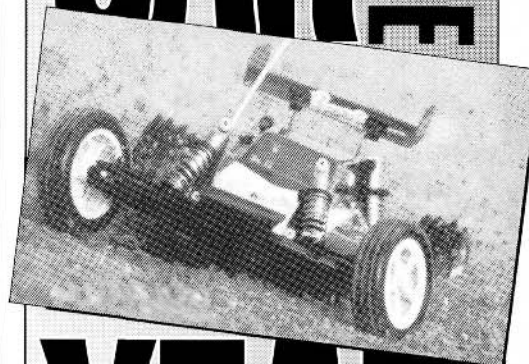
they moved into the top five.

In the Outlaw Sprint Car Class, John Grubb and Russ Smith came from off the pace to qualify for the 7th and 8th spots in the A-main. Their 26-lap runs weren't up to Steve Minea's 29-lap TQ effort, so they still had some work left to do. Skipper Sjobeck finally "dialed into" the Novice Class. With his 25-lap run, he made an impressive jump up to the 2nd spot. Gary Fulp was the only driver in the 4WD Open Class to

(Continued on page 164)

COMING NEXT MONTH!

CAR OF THE



YEAR

FEATURES

20 Hot Motor Tips
Project King Cab
Racing Truck Fine-Tuning
Home-Built Hot Rod

TRACK REPORTS

Corally SP 10
Kyosho Turbo Ultima II
TRC Pro 10 Sport

COLUMNS

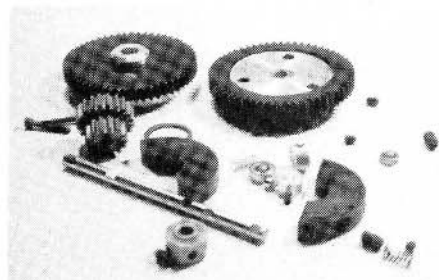
Dirt Digest
Hot Tracks
Scoping Out
Troubleshooting

DIRT DIGEST

by BILL O'BRIEN AND BOB KANE

Dirty doings

IT HAS BEEN about a week since I finished the last edition of "Dirt Digest." Writing a column before someone from *Car Action* calls to tell me that I'm late is a new experience; it certainly lacks the pressure that has always made life interesting. The truth is, I'm so full of information (or is that the tacos I ate yesterday?) that I couldn't risk forgetting any of it over the span of a few weeks. I figured I'd sit down and keep writing, and I bet that His Pondness won't be displeased to receive my article early. (There's nothing like killing two birds with one stone—or one "Dirt Digest," as the case may be.)



Although the basic components for a 2-speed tranny are all available, no one has tried to assemble one for an off-road car or truck yet.

QUESTION OF THE MONTH

Why hasn't anyone tried (or claimed to have tried) a 2-speed transmission in an off-road car? It seems to me that a higher gear ratio would be great for coming out of turns or getting back to speed after jumps. When the car is up to speed, however, a lower gear ratio would be better to boost the top end. They're out there (Nova* and Lazer Lite* sell them), but nobody's experimenting with them. C'mon folks! Don't expect me to do all the work for you! Help an old guy out—push the envelope!

DURATION OF THE MONTH

If you thought that D-cell 4000mAh battery packs were the last word on duration for twin-motor trucks, you

were wrong. A company called Cermark* sells F-cells. They're bigger than Ds and with good reason: they're 7000mAh batteries. Yes, I said they have a 7A capacity, which should keep you running for about 45 minutes or an hour. What a rush! But wait—there's a dark side! F-cells currently sell for \$15 each (the prices go up and down, but usually up). It costs about \$90 for enough cells to make a 6-cell pack, plus the cost of wires, connectors and shrink wrap. It's a lot like paying premium prices for diesel fuel, but from a run-time-per-dollar perspective, it's about \$12 to \$30 less than the cost of six normal 1200mAh 6-cell packs. In the words of Johnny Storm, "Go for the burn."

GRIPE OF THE MONTH

We're all going crazy. That's not a theory; it's a fact. Look through the pages of any *Car Action*, and you're likely to see some odd, wonderful mobile creations. (I know, because I've designed some of them!) The one thing they all have in common is a voracious appetite for radio channels. Lights, cab/body tilting, bed tilting, steering, speed and all the other features on these vehicles need more than 2 or 3 channels. Unfortunately, if you need a lot of channels, you have to use an airplane radio and make darn sure that you don't bring someone's \$2,000 plane down while you're using it. (Having an 8x12 Zinger propeller inserted into your chest cavity isn't a pleasant experience, but it's the least you can expect from an irate pilot.)

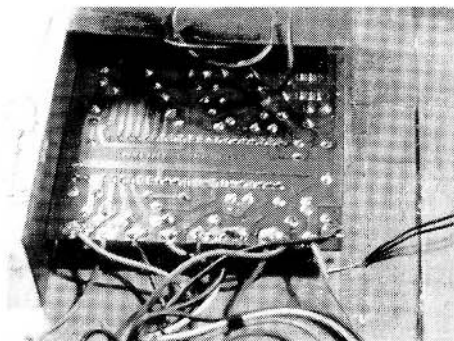
Why aren't there any multiple-channel car radios? World Engines* makes a 7-channel AM stick radio (for airplanes, of course) that sells for \$200. How difficult could it be to design the radio with a 75MHz output? It's not any more difficult than designing a 72MHz radio, so we could, theoretically at least, have multiple channels at an affordable price. We don't need FM or PCM; the

only "M" that's necessary is the one in "motivation!"

What about a letter-writing campaign? Put down your copy of *Car Action*, get some paper and a pen (it looks better than pencil), and write to every R/C radio company (or just to the one that manufactured your radio). Be nice about it, but tell the company that the R/C car market has grown up, and you want a radio with at least five channels (but preferably more!). That's how you get things done.

TIP OF THE MONTH

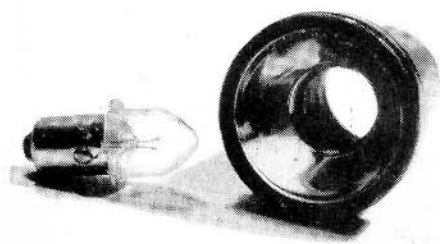
Nylint makes metal truck/trailer combinations, and they have a model called the "Sound Machine" (or something like that). I've seen it in Toys 'R Us; big deal, right? Well yes—it is. The model isn't scale, but the truck has a sound system that produces ignition-start-up, motor-idling, motor-



This 2x3-inch board (taken from a Nylint toy truck) can produce almost every imaginable truck sound.

speedup, reverse-beeping, air-brakes and diesel-horn sounds. It's powered by four AA batteries, and the sound module, with a speaker, is 3 1/2 inches square by 1/2 inch deep. The truck costs about \$45, and the sound system alone is worth the price of admission!

Although most of the synthesized sounds are activated by push buttons, some of the equipment is tricky. For example, there's what looks like a photoelectric sensor that determines whether the wheels of the truck are turning forward or backward. This



To simulate large Hella lights, use the bright Krypton bulbs from Radio Shack pen lights. (They'd even make Superman back down!)

sensor triggers the forward fast-engine or reverse beeping sounds and the air-brakes noise. Electric "eyes" scan a coded wheel that turns when the truck's wheel turns. It will require some ingenuity to adapt this to an R/C vehicle, but it can be done. Get the hint?

LIGHT OF THE MONTH

Do you want really bright lights for night racing or just for showing off? Radio Shack's pen lights use Krypton bulbs that are almost twice as bright as standard incandescent bulbs. From a scale point of view, the lens and bezel are about the right size for a big Hella fog light. The bulbs are longer, but you'll be able to hide their depth behind the grill. You'll also have to saw off most of the pen-light barrel and hardwire the batteries. The bulbs only use two AA cells, and they'll last for about 40 minutes of continuous use.

FUTURE SHOCK

Ni-Cd batteries have one major drawback: cadmium is a toxic material. If discarded Ni-Cds are crushed or start to leak, the cadmium that's released will poison the environment. That's not a theory; that's a fact. The nickel-hydride battery is the solution to this problem. Its construction is similar to that of a Ni-Cd, but instead of using cadmium for the negative electrode, hydride is used. The EPA hasn't classified hydride as toxic so, in theory, it's environmentally safe.

Hydride batteries also have higher current ratings than Ni-Cds. The typical

AA-size Ni-Cd has a 480mAh rating and a hydride of the equivalent-size has an 1100mAh capacity. Sub-F-size batteries that are a little larger than AA cells top out at 2300mAh, which is about 70 to 100 percent more capacity than their Ni-Cd equivalents. Sub-C cells, our stock and trade, aren't available yet, but you should start to see them sometime in June. Imagine 3000mAh 6-cell packs that aren't any larger or heavier than those you use now.

ALL CHARGED UP

Hydride batteries do have a few drawbacks. Although Ni-Cds and hydrides have similar charging requirements, they aren't identical. You might have to use different chargers for hydrides. (This is especially true for the peak-detector-type fast chargers.) Unless you want to carry two chargers with you, you won't be able to switch between the two battery types. (This news is better than the original rumors that said hydrides had to be slow-charged for two days.)

Availability and pricing are perhaps the most important topics. As mentioned, hydrides aren't expected to be available before the first quarter of 1991, and they won't be available in quantity until later. Gates* (through the Millennium brand name) will be one of the first companies to release them and, because they're new, you'll be paying for development costs up front. Initially, you can expect hydrides to cost twice as much as Ni-Cds, but this will change as they become more available.

NEXT MONTH

1991 seems to be shaping up as the year of electronics. New speed controllers abound; new batteries are on the horizon; motors are becoming more durable, and some are even tamer and less expensive for those of us who prefer life in the less-fast lane. You'll need to learn a little more to build a

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(Continued on page 196)

A yellow water-rocket with a magnum load!

WAREHOUSE HOBBIES *Team* **ENFORCER**

by GERRY YARRISH





WHEN I WAS given an opportunity to review the Warehouse Hobbies* Team Enforcer, I couldn't say "yes" fast enough! The popularity of weedeater-engine-powered designs has been increasing so rapidly that I just had to try one.

THE PACKAGE ARRIVES

The Enforcer arrived in the biggest box I had ever received. I tore into the cardboard and found that it was so well-packed that I had a dickens of a time getting the box open. When the reinforced tape finally submitted to my assault, I was rewarded with the biggest, most impressive model I've yet seen. The finish was a bright yellow gelcoat that looked flawless. The model sat in a sea of foam peanuts, protected both fore and aft by big blocks of Styrofoam. (The shippers took no chances when making sure this model would arrive intact.)



PHOTOS BY YAMIL SUED

SPECIFICATIONS

Length:	46 inches
Width:	14.5 inches
Freeboard:	4.5 inches
Construction:	Hand-laid fiberglass
Finish:	Gel-coat (red, white, yellow, black)
Engine:	25cc water-cooled (recoil start)
Propulsion:	Prop-driven cable drive w/clutch
Fuel:	Gas/oil mixture
Run Time:	45 minutes to 1 hour (average)
Speed:	30+mph (stock setup)
Weight:	approximately 16 pounds
Radio:	2-channel
Suggested Retail Price:	\$949.95

I was also very pleased to find that the model was accompanied by a brand-new Futaba FP-2NBL

Because this was the Deluxe package, it was almost ready to go; in fact, I just had to install one bolt to attach the rudder

2-channel radio. The receiver, battery box and servos were already installed in the radio box, and the transmitter was safe inside the system box in which it was originally purchased. I only had to add the 12 AA batteries to power the radio (four in the receiver and eight in the transmitter).

to the aluminum rudder-mount bracket and to attach the rubber water-pickup tube to the brass water-pickup tube that exits the bottom of the rudder. This is the ultimate in simplicity!

FINAL INSPECTION

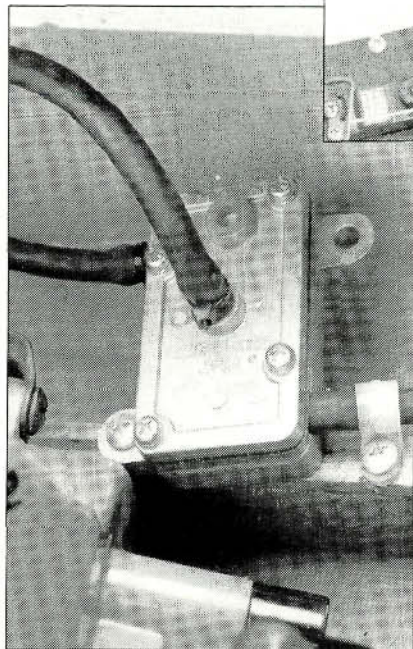
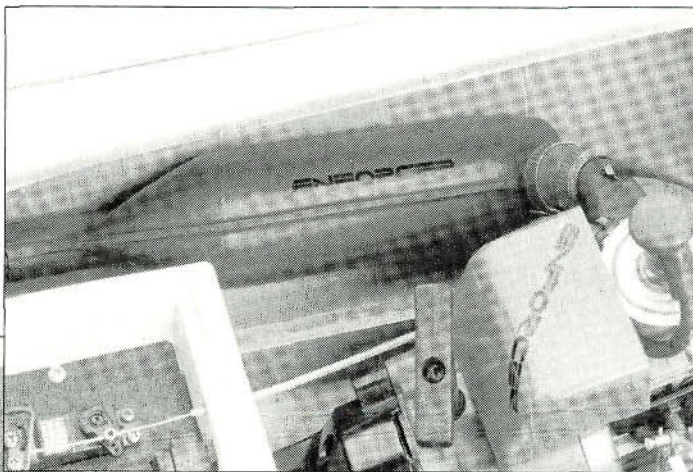
Just before we left for the lake, I made one final check of all the nuts and bolts to see if any needed further tightening. I was able to give a few bolts a quarter turn more, but this was just to satisfy myself and isn't a criticism of the kit. (None were loose!) The only tools needed were an adjustable wrench, a regular screwdriver and a Phillips screwdriver, an Allen-wrench set and a pair of scissors. (I'll explain the scissors later!) We made a gallon of 16:1 gas/oil fuel and took along an ABC fire extinguisher—just in case!

ON THE DECK

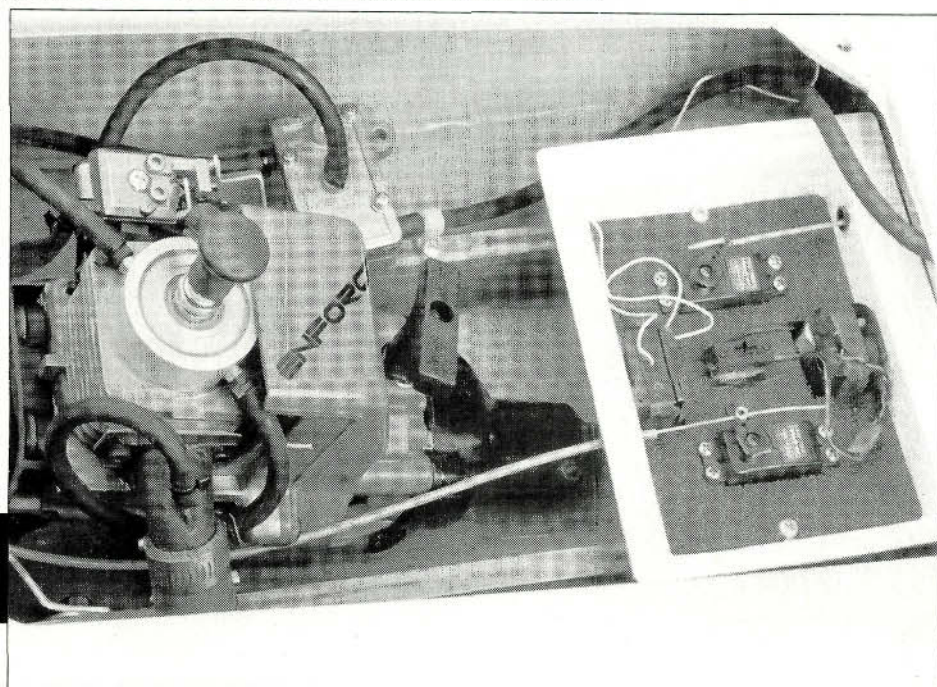
I thought the best place to test this big vee-bottom boat was off the public marinas at a local lake. We went all the way to the gas dock (some 300 feet away from any full-size boats) and prepared to do some serious wave bashing. With

The Quiet Power Muffler is made of fiberglass and attached to the inside of the hull.

The water pump that cools the engine is mounted on the right motor-mount beam.



View of the weed eater engine and the radio box inside the hull.



me were Marc D'Antonio (with video camera) and Yamil Sued, Air Age's ace staff photographer. Yamil was ready with the camera, Mark pulled the safety pin on our fire extinguisher, and I was ready to switch on the radio.

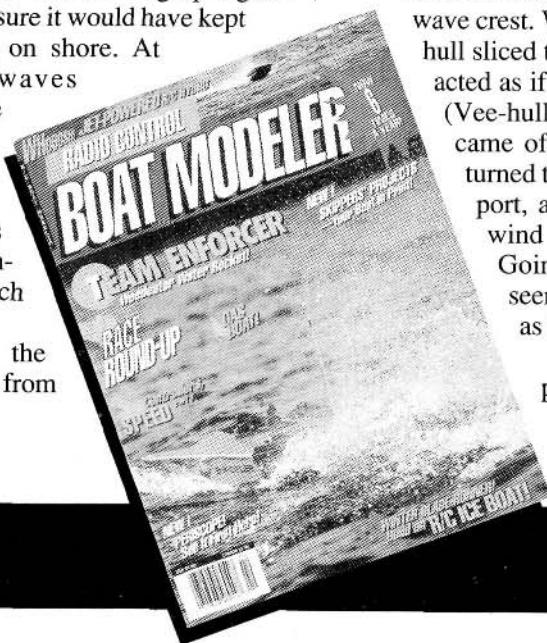
Here in the Northeast, we attach the clear-plastic radio-box lid in a novel way: we simply tape it on with clear shipping tape that's about 1 inch wide, and the scissors are needed to cut the tape. I did as instructed, and it worked really well! (After half a day of running, the radio box was as dry as a bone.)

After the radio had been turned on and the box taped shut, I took out my funnel and filled the gas tank. In the excitement, I overfilled it, and the excess splashed onto the engine and the radio box. (Marc was all set for a fire, but his services weren't needed.) I positioned the model with the rudder and prop hanging off the dock and the hull right in front of me. I closed the manual choke and tugged the recoil starter sharply. After three or four pulls, the engine sprang to life, and after waiting a few moments, I opened the choke. I advanced the throttle slowly and then quickly to check the engine's response. When it had made the transition to full throttle without dying, I put the boat in the water, and we were set to go.

PERFORMANCE

As the boat sat idling, the sound of the "wet" exhaust was very pleasing—not at all like a model, but more like its full-size counterparts docked a few hundred feet away. The wind was blowing up a good chop, and I'm sure it would have kept smaller boats on shore. At times, the waves broke over the dock and wet Yamil as he tried to get his low-level shots without drowning. (He has such a tough job!)

I motored the Enforcer away from



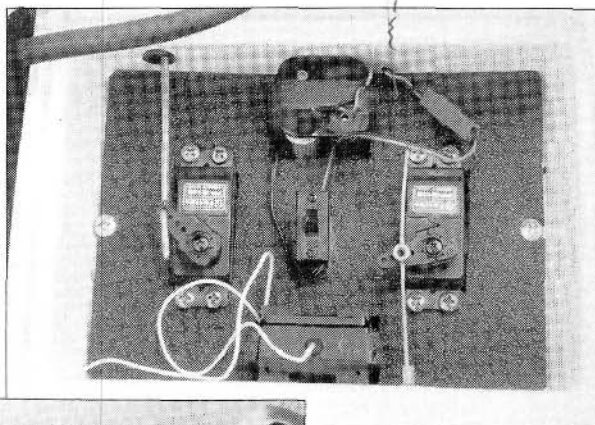
the dock at about quarter throttle and pointed its nose straight into the wind. I punched the throttle and, at first, the prop cavitated, but in about 25 feet, it bit firmly into the water and brought the hull up on plane. Its speed into the wind was impressive, and half the time, it launched itself from wave crest to wave crest. When not airborne, the hull sliced through the waves and acted as if it were right at home. (Vee-hulls favor rough water.) I came off the throttle slightly, turned the boat 180 degrees to port, and it made its downwind pass with authority. Going with the wind, it seemed to be going twice as fast.

I made repeated passes for the camera,

with Yamil saying, "Great! Do it again—only a little closer!" At one point, I heard, "Err...Great. Do it again—only a little farther out, please!" The boat was always fully controlled and never seemed endangered by the now very rough waves. (A full-size boat in "scale conditions" would have injured passengers, for sure.)

After about half an hour, I brought the boat in to check its fuel supply. I was amazed to find it still had two-thirds left! Yamil said he was out of film, though, and there was no reason to stay out in the cold. I handed him the radio, and he forgot about calling it a wrap! Marc also

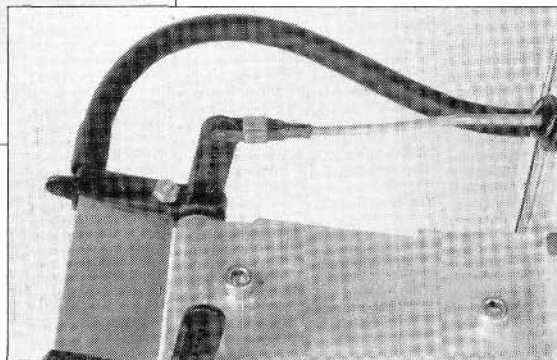
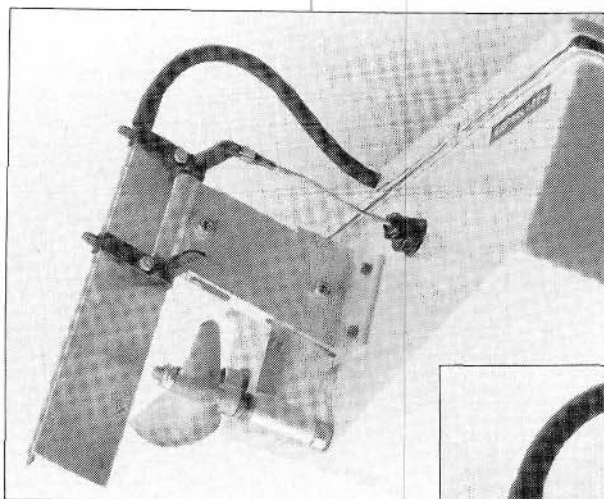
(Continued on page 198)



▲ The radio-box interior. The lid is simply taped on with 1-inch shipping tape.

◀ All the running hardware is readily available from Octura Models.

The only assembly required: installing the attachment bolt and connecting the water pick-up tube to the rudder.



To find out more about R/C boats, check out Radio Control Boat Modeler—one of Car Action's sister publications.

CLEVELAND CHAMPS

(Continued from page 67)

Arnold, who had never let Kesserich get more than 15 feet away, now closed the gap. Kesserich took the cleanest line possible through each of the harrowing turns, while Arnold poured on all the power he had left. Just when it looked as if Arnold would challenge Kesserich for the lead, he seemed to lose power—with only 10 seconds left! This gave Kesserich just enough breathing room to sail over the line in 1st.

Next up was the Modified B-Main. With the biggest names in R/C racing in the lineup, it looked like the finals for the World Championships! The crowds packed the sidelines and anticipated the sounding of the horn.

After a messy start, Joel Johnson emerged as the leader for the first lap; TQ Chad Coppick followed; and Ron Ferguson was 3rd. Stuck farther back in the pack as a result of the slaughter at the start were Kent Clausen and Rick Hohwart. Johnson continued to hold his lead until he came up on Tyree Phillips and Clausen, who were engaged in a battle for position. Johnson managed to get by Phillips cleanly, but as Johnson and Clausen paired up to go into a turn, their cars tangled.

The momentary collision let Coppick and Aaron Treppa past for 1st and 2nd. Johnson (now 3rd) snuck past Clausen and put up a fight for the 2nd position, but Coppick maintained a tight line and held him off. Just past the halfway point, Coppick rolled in the turn at the end of the long straight, and this put Johnson into 2nd—just 4 seconds behind Treppa. Meanwhile, Hohwart managed to collect himself from his earlier troubles and came up to take the 3rd spot.

Johnson was beginning to close in on Treppa when he hit a board, and his weekend ended prematurely. Hohwart moved into 2nd behind Treppa, but a gap of $\frac{3}{4}$ lap was too much to make up in the 45 seconds that remained, and Treppa held on for the B-Main win.

AWESOME A-MAINS

Next up was the Stock A-Main. Chuck Sommers charged forward from the 2nd starting position to take an early lead, swapped positions with Sean Cochran (who started from 7th position), and then regained the lead during the first lap. Even though he had a clear power advantage, Sommers cut a turn too closely

(Continued on page 128)

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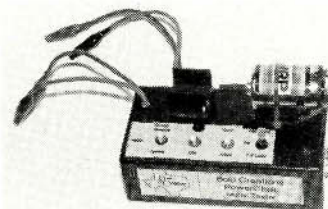
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CLEVELAND CHAMPS

(Continued from page 127)

and was bumped back to 4th. Cochran took the lead, and Chuck Mackin (who started in 10th) held on to 3rd right behind Wayne Penfold.

Cochran continued to hold his lead, but less than 3 minutes into the race, Penfold challenged him for the lead. Penfold tried to get the inside move on Cochran, but there wasn't that much carpet, and he crashed into the boards. Cochran managed to hold a comfortable lead until the closing seconds when Penfold made a final charge. He pushed his car *too* hard, and a "bobble" let Cochran coast in for the win!

The Modified A-Main was the final event of the weekend, and it was standing-room only as the top 10 drivers lined up to thrash it out for the win. The buzzer sounded, and they were off.

TQ Joe Lawrence got the lead through the first turn, but Mike Blackstock and Chris Doseck followed in hot pursuit. Before the order was sorted out for the first lap, Doseck got by for the lead, followed by Frank Callandra, Terry Rott and Mike Ebert. A bobble by Calandra let

Rott into 2nd, but he wouldn't hold this position for long, as Ebert soon rolled by. Doseck looked as if he was running away with the lead, while Ebert, Rott and Bud Bartos were tied up in a battle for 2nd.

Just past the 5-minute mark, Doseck clipped a board, and the battle for the lead tightened, with six cars at close range. Doseck managed to stay out in front, but Ebert was right on his bumper. Rott pulled up next to Ebert in hopes of making a challenge for the lead, but he couldn't muster enough power to get by.

Doseck looked as if he would hold on for the win, but then his whole race fell apart; with only 40 seconds to go, he lost a lot of power. Ebert was also "softening up," but he made his way past Doseck, who was now in "dump city." Ebert had a clean shot at the finish line, but the win wouldn't come easily, as Rott was closing the gap with plenty of power. Ebert seemed to stretch his car to a width of 6 feet as Rott made a last futile attempt at taking the lead! In the closest race of the event, Ebert held on for the title in the Modified Class.

Congratulations to all the winners at the Cleveland 1/12-scale Indoor Champs!

BEST R/C PILOT

(Continued from page 90)

SKY DANCING

Scored separately from the main event, the 3-minute Free-Style competition was a display of creative flying at its best—apparent magic on the R/C sticks. Chip generated roars of approval from the crowd with a flawless knife-edge vertical figure-8 and a snap roll every 180 degrees. His slow-motion torque rolls—in which the plane hung suspended and slowly revolved through plumes of smoke—were also crowd-pleasers.

Chip's ability to fly nearly perfect 360-degree circles interspersed with barrel rolls or snap rolls in alternate directions was astounding. His routine, which was full of such feats, was marked by talent, discipline and energy, and he took 2nd (\$2,500). Quique Somenzini of Argentina finished 1st (\$5,000); and David von Linsowe, of Mt. Morris, MI, was 3rd (\$1,000).

Toward the end of the tournament, I caught up with Chip. Although clearly proud to be the frontrunner in such distinguished company, he was disappointed

(Continued on page 138)

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BEST R/C PILOT

(Continued from page 128)

that he hadn't had a chance to compete against Hanno Prettnr. Chip said he looks forward to flying against Prettnr when both are well-prepared.

Will Chip win the next TOC (which will probably be held in 1992) and maintain his title as the best R/C pilot in the world? It's guaranteed to be a great contest, and I recommend that you attend. You're sure to have a great time! ■

BURNS DX

(Continued from page 97)

side windows to let more air pass over the cylinder head for cooling. I also mistakenly cut out the area in front of the rear shock tower for the nonexistent roll bar. The addition of body washers would make the body pin holes more durable; this body really takes a beating.

BURNING UP THE TRACK!

Before going outside to fire-up this bad boy, I read all the information included with the engine two or three times, and I studied the "starting and running" check

(Continued on page 160)

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- ☐ 12-Cell Modified, dual motor

Hull type:

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TROUBLESHOOTING

by STEVE POND

Illustrations by JIM NEWMAN

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897.



OUT OF CONTROL

I have an RC10 graphite, and a Futaba Magnum Jr. (old style) controls it. Power is supplied by a 6-cell pack with a Novak T-4. My problem is that it won't go 20 feet away from me without losing all control. I mounted my receiver on the rear shock tower according to the instructions, and I didn't cut the antenna. The excess wire is wrapped around a spool, and it doesn't touch the chassis. I don't think my Twister Yokomo 4WD stock motor is the problem because it has run well in the past. Please say you can help!

Mike Pits
New Orleans, LA

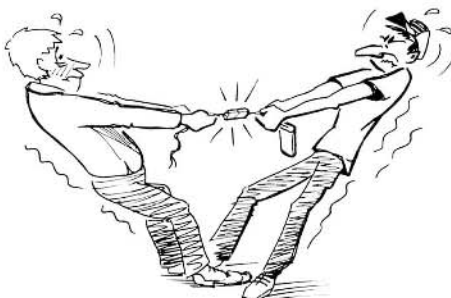
It sounds as though you've installed the radio properly, so I'm leaning toward the radio system as the source of the problem.

Crystal damage can often cause problems with radio range or glitching. A good hard shot into a wall can damage the receiver's crystal enough to cause problems, but not enough to shut it down. Try a set of crystals from another Futaba radio (make sure it's on the same band—27MHz or 75MHz), and see if this solves your problem. If it doesn't, make sure

your receiver is getting enough power from the speed controller's BEC unit.

Using a voltmeter with pointed probes, poke through the insulation of the black and red wires that connect the speed controller and the motor. With the car in an idle position, the meter should read between 5 and 6 volts. It's possible for the radio to operate on a lower voltage, but it's risky.

If all else fails, send the radio back to Futaba and have them take a look at it. If it needs repairing, their prices are reasonable.



CONNECTION INSPECTION

I have an RC10, and lately, I've had problems with the connectors. They get very hot after each run and finally, they wouldn't come apart. I bought new connectors, and it happened again. I used a Novak T-4 with a DuraTrax 1500-plus battery and a Kyosho 34-degree Superstock motor. I changed my spur-and-pinion gears to 48-pitch (86-tooth spur and 21-tooth pinion). The Novak troubleshooting guide said that hot plugs mean over-gearing. Is this true? What's my problem?

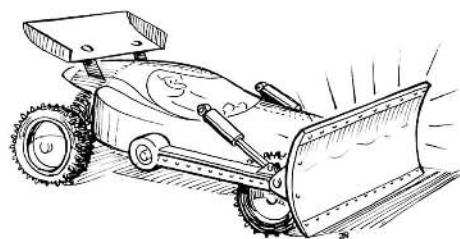
Keith Kytola
Roseburg, OR

Over-gearing can certainly result in hot connectors because of the dramatic increase in current flow, but this may not be the source of your trouble. With the gearing you mentioned, the overall ratio is a little excessive for some tracks, but it's by no means enough to overheat your connectors.

Chances are, your old connectors have deteriorated, and the new ones don't fit together snugly. When contact between two connectors is poor, there's much more resistance because the current is passing through a reduced contact surface. Because of the increased resistance, heat is generated, and the plug gets hot. In some cases, connectors can even weld themselves together, as you described.

I assume that you use a Tamiya-style connector. Reach inside the male connector, and with a needle-nose pliers, slightly squeeze the metal pin receptacle. This will make a tighter fit and increase the contact area.

Another possibility (although a remote one) is that your motor has deteriorated so much that it's drawing excessive amps. Check the condition of the brushes and the commutator. If the brushes are extremely worn and the commutator is black, it may be time for a new motor. If the motor is in good shape, try a different connector, e.g., a Sermos Power Pole, which is much more efficient.



TAMING THE CAT

I'm having a problem with my Pro Cat. The front-end belt slips off the differential. Sometimes I can fix it, but not for long. I even super-glued the front diff pod into place after I had the belt perfectly aligned with the diff gear. After using four battery packs, the problem returned. Is there a flanged diff gear to replace the stock gear?

Despite the "break-back" front suspension and bumper that I installed, the front end of the Pro Cat is very fragile. Is there an after-market bumper to protect the en-

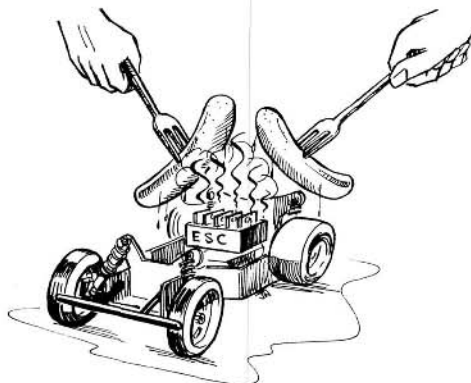
tire front end? Also, is there an after-market steering system that's faster and stronger than the stock one, which breaks easily?

Doug Hoenie
Celina, OH

I've been racing 4WD Schumacher cars for some time, and I haven't had the problems you've had—at least, not to the degree you mention. There are no belts on the Pro Cat pulleys because every time a belt rubs against the pulleys, it robs the car of battery power and speed. The barrel-shaped design of the pulleys keeps the belts centered without the need for flanges, but the pulleys must be aligned properly for this design to be effective. On the Pro Cat, you can adjust the belt tension with two screws in the front bulkhead, but many don't realize that these screws also align the diff assembly with the belt.

To adjust the belt alignment properly, fasten the car to a stand so that the car's four wheels are off the ground. Turn your radio on, and set the steering trim to its highest point so that the motor runs and the wheels spin without your holding the trigger. From the front of the car, tighten or loosen the screws until the belt is riding in the center of the pulley. If the belt is riding off the pulley to the left, tighten (or turn clockwise) the left adjusting screw. Do the opposite if the belt is drifting to the right. If a radical adjustment is needed to make the belt run true, adjust both sides so that the belt tension isn't affected. For instance, tighten the left adjuster one eighth of a turn, then loosen the right adjuster one eighth of a turn. This is the equivalent of turning one or the other one quarter of a turn, but it won't affect the belt tension. As a last resort, you could change to flanged pulleys, but I'd give the stock ones another shot.

I don't know of a larger bumper specifically for the Pro Cat, but you can make one of plastic. It usually takes a hard shot to break something, so why not avoid those barn-burning crashes?



TOO HOT TO HANDLE

Earlier this year, I bought an RC10 aluminum chassis with bushings and a Futaba MC112B ESC, so that I could have a reversing speed controller. The man at my local hobby shop installed it on the rear shock tower.

When I run my RC10, the speed controller gets pretty hot, and the heat sinks are almost too hot to touch. A friend suggested that I mount it on the chassis, but it got just as hot. Will my speed controller burn out? How can I cool it down without cutting holes in the body? Someone suggested using a flat graphite chassis so that air flows under the body. Will this help?

Joe Ringeisen
St. Louis, MO

Of all the Futaba speed controllers, the MC112B has the lowest amp rating. When you choose a motor, make sure that the speed controller can handle it. For the 112B, a stock or slightly modified motor is suitable. For instance, if you run anything lower than a 20-turn motor, you may be overloading the speed controller, or at least working it hard enough to make it very hot.

To help dissipate heat, attach another heat sink to the existing one. A change in the gear ratio may also help to lessen the load on the speed controller. This will slow your car down, but you'll avoid the cost of replacing a burned-out speed controller. Also, a flat graphite chassis is an expensive solution to your problem, but I don't recommend it.

(Continued on page 156)



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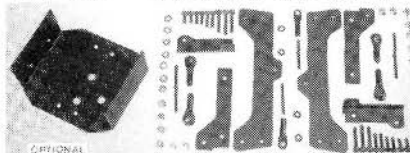
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TROUBLESHOOTING

(Continued from page 153)



TRACK TROUBLES

I drive a Losi JR-X2 on a clay oval during the summer, and I'm having some handling problems that I hope you can help me with. There's no problem when the track is moist; in fact, I hold the track record in both the Stock and Sportsman Classes, and I'm in a position to clinch the points title in both Classes. My problem arises when the track is allowed to dry out. It gets very hard and slick, and I have difficulty handling the car, especially on standing starts. The rear end tries to break loose immediately, and it's very difficult to get it going.

I've converted my car to a mid-engine configuration, which gives me outstanding speed through the corners when there's good traction. I have a Robinson toe adjuster on the rear with the toe-in set at about 1/8 inch. The rear camber is set to about 1/8-inch negative, and I use stock Losi front shocks on the rear with an oil mixture of 5WT and 20WT.

When the track is hard, I move the rear shock collars most of the way up and loosen the diff to try to get better traction in the rear. On the front, I have a Slam-Dunkin' suspension with Kyosho Platinum shocks and 90WT oil. The front toe-in is set at about 1/16-inch, and the front camber is set at about 1/8 inch negative. The front tires are stock Losi ribs, and the rear tires are Losi vari-spikes, although I've tried the whole line of Losi rear tires and even some grooved foams. I use an ASA Mustang body with a side dam, which makes the car very stable through corners when the track is moist.

I've decided to stick with what I've got for the last two races this season. I hope the track will be wet, but I'd like to be prepared for dry track conditions next year. Would a slipper clutch solve my problem? How about one of the new speed controllers with variable current limiting? Maybe radial tires? Any other ideas?

Richard Frahm
Robins, IA

Experiment by changing the position of the rear upper links that are attached to the bulkhead. In the stock location, there's very little change in the camber angle when the suspension is compressed. This setup works very well for high-bite tracks where traction isn't much of a problem, but on slippery surfaces, try a different setup on the rear upper links.

By moving the upper link's attaching point out from the center of the car, you effectively shorten its radius. The farther out and down you move this attaching point, the more it will affect the suspension as it compresses, and the result will be an ever-increasing camber angle. This won't help too much off the starting line, but it can make a big difference when you're cornering.

As the car leans into a turn, its suspension compresses. With a setup that doesn't allow for a change in camber angle, the outside tires (which provide most of the traction in a turn) are riding on their outside edges. With decreased contact between the tire and the track, the car is likely to spin out or at least oversteer. With increased camber, the top of the tire will be pulled inward as the suspension compresses and compensates for the chassis' rolling motion. Properly set, it will keep most of the tire on the track and give more predictable handling.

A simple way to check whether this is set properly is to keep an eye on tire wear. If the outside tires are constantly wearing at their outside edges more than the insides, move the pivot point of the upper link to one of the outer holes on the bulkhead. Experiment with this unit until the tires wear evenly.

The mid-engine setup isn't helping you much, either. By moving more weight toward the front of the car, the weight transferred to the rear under acceleration is reduced. Switching the car back to the original setup may help. A smooth diff is also extremely important!

Slipper clutches and torque-limiting speed controllers certainly help on slippery tracks, but I'd try all possibilities before investing in any new equipment. Although you've tried a number of combinations with limited success, don't give up. It sounds as though you're an accomplished driver who knows how to tune his car but, no matter what you do, there's only so much traction available on a dry, hard-packed track.



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BURNS DX

(Continued from page 138)

list. Don't expect to rip up the track right away; the motor requires a careful break-in. I followed the steps outlined in the instructions, and my engine is easy to start and runs smoothly.

For my track tests, I headed to R/C

World in Danbury, CT. I'm very familiar with this track because I competed in their monster-truck racing series every week last summer. This was winter, and it was very quiet—at least, for the moment!

After checking the Burns DX thoroughly—batteries, radio and starting gear—I fired up. Allowing the O.S. en-

gine to warm up with short blips of full throttle, I fine-tuned the needle-valve adjustment according to the instructions. With the engine running properly, I set the car on the track.

I blipped the throttle, and the DX immediately lurched forward as all four tires

(Continued on page 162)

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BURNS DX

(Continued from page 160)

bit into the rain-sodden clay surface. The DX accelerated violently down the first straightaway and, in a fraction of a second, it hit a short, steep jump halfway along it. Instinctively, I let off the throttle as this missile launched skyward. *Holy cow!* By the time it had finished cartwheeling, the DX was well into the second turn. After retrieving the overturned vehicle, Editor Steve Pond (who was there to offer technical and moral support) told me that applying full throttle

when the car is airborne will keep its nose high for a smooth landing.

It's incredible how this car tears around the track! Following Steve's valuable advice, I soon had the DX turning laps at a speed no electric could hope to touch. During a fuel stop, I increased rear-spring tension slightly to counteract some "squat," but I left everything else set according to the instructions. The car's handling was super-predictable when it hit the track for round two. During each lap, it went faster as I became comfortable with four-wheel, full-throttle power slides

around the sweepers and 10-foot flights over the big jumps.

At the end of our session, I inspected the Burns DX for damage. After *that* thrashing, something major *had* to be broken! Wrong! I was more than psyched to find only *one* problem: a seam on the rubber half of the stock muffler had torn and wasn't repairable. This is the most durable car I've ever seen! It's easy to build and maintain, incredible in performance, and the very few problems I had with it are easily solved with optional hop-up parts.

(Continued on page 164)

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Team Astro Sweeps The NATS

In Truck Pulling and Drag Racing Astro Motors are almost unbeatable. Astro motors have powered more trophy winners than all other makes combined.

IEDA Drag Racing Fall Nationals Colton, Ca. Nov. 3, 1990

National Speed Records

Top Speed Unlimited Rail 71.02 Mph Roger Rose, Astro Top Fuel II Motor
Low E.T. Top Fuel Rail 1.981 Sec. Mike Ogle, Astro Top Fuel I Motor

Track Record Oct. 28, 1990

Low E.T. Unlimited Rail 1.820 Sec. Roger Rose, Astro Top Fuel II Motor

IEDA Nationals Winners

1st Place.....Pro CompEric WiemsAstro Top Fuel I Motor
2nd Place.....Pro CompRoger RoseAstro Top Fuel I Motor
1st PlaceTop Alcohol Rail.....Brian ReeterAstro Top Fuel I Motor
1st PlaceTop Fuel Funny Car...Eric WiemsAstro Top Fuel I Motor
2nd Place ...Top Fuel Funny Car...Calvin Grant ...Astro Top Fuel I Motor
1st Place.....Top Fuel DragsterMike OgleAstro Top Fuel I Motor
2nd Place.....Top Fuel DragsterMike RussoAstro Top Fuel I Motor
2nd Place....Unlimited DragsterRoger RoseAstro Top Fuel II Motor

NR/CTPA World Championships Champaign, Il. Sept. 30, 1990

1st Place..... 2WD Modified.....A. JanickiAstro Pullmaster I Motor
2nd Place ... 2WD ModifiedDutch EsagroAstro Pullmaster I Motor
3rd Place 2WD Modified.....David Hester ...Astro Pullmaster I Motor
1st Place.....2WD Open IKyle Haynes.....Astro Pullmaster I Motor
3rd Place2WD Open IMarcia Arman Astro Pullmaster I Motor
1st Place.....2WD Open II.....Jim Bee.....Astro Pullmaster II Motor
2nd Place....2WD Open II.....Scott Weigel.....Astro Pullmaster III Motor
3rd Place ... 2WD Open II G. KinseyAstro Pullmaster II Motor
1st Place..... 4WD Open ISean CullenAstro Pullmaster I Motor
2nd Place.... 4WD Open IDon Fisher.....Astro Pullmaster I Motor
2nd Place ... 4WD Open IIDale ArmanAstro Pullmaster II Motor

Team Astro 13311 Beach Ave. Marina Del Rey, Ca. 90292 (213) 821-6242

BURNS DX

(Continued from page 162)

*Here are the addresses if the companies mentioned in this article:

Kyosho/Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61824.

Loctite Corp., 4450 Cranwood Ct., Cleveland, OH 44128.

O.S. Engines/Great Planes Model Distributors.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

Zap; distributed by Frank Tiano Enterprises, 2460 SW 85th Ter., Davie, FL 33324. ■

FLORIDA CHAMPS

(Continued from page 105)

improve his time, and he got within striking distance of Raskin and Shea. He had to find some extra ponies as he was still a couple of laps off the pace. With the rest of the classes already established by Saturday's qualifying, the Mains were posted, and the final hunt for the top spot was on.

A-MAINS NOVICE

To encourage first-time racers to compete in a national event, this class was run on a trial basis. To give you an idea of how competitive these young drivers were, Skip Sjobeck's winning run was faster than all but one of the A-Main Open Truck times!

There was a huge pile-up right off the start. (Nerves probably played a big part in this race!) Pole sitter Kenny Davis did a "360" and went to the back of the pack. Aaron Figler and Matt Parson broke from the pack and waged a good battle for an early lead. The youngsters settled down, though, and the top three turned in some decent lap times.

At the halfway mark, Michael Craig went turtle coming out of the third turn. His car's suspension failed, and he was unable to continue. Up front, Sjobeck continued to dominate, and he opened up some distance on the field. Figler and Parson (kind of young for a law firm, don't you think?) went a lap down to the leader, but they were still locked in a battle of their own. With less than 30 seconds to go, Kenny Davis dropped off the pace owing to cell degeneration, and the field settled in for the duration. At the buzzer, it was Sjobeck with one lap over Figler and Parson. Mike Madigan and Kenny Davis were well back for the 4th and 5th spots.

2WD STOCK

The top 10 qualifiers came to the line with

(Continued on page 166)

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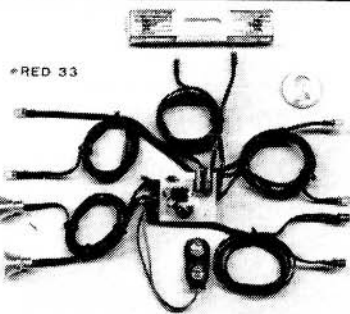
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FLORIDA CHAMPS

(Continued from page 164)

a huge two-lap difference across the grid. With such a large speed difference, working the traffic on the slick track would be essential to get to the front. The first rows got away cleanly, but there was major chaos among the back markers. Based on the qualifying times, it looked as if Art Wilson and Kevin Mandeville would make short work of the field, but it wasn't long before they caught the back markers and were fighting just to keep

pace.

After the first couple of laps, the demo derby settled into a good race with plenty of passing. Will Cordelo never recovered from a first-lap slam-jam and finally parked it after only three laps. Cam Crawford (great racing name!) took his ride to the sidelines at the 90-second mark with only eight laps in the bag. With the field down to eight cars there was more room to maneuver.

The freight train of Wilson, Dispenza, Mandeville and Schaub started to flex their muscles. At the halfway mark, Troy

Desmarais and Gary Gallagher had fallen off the pace, and Bill Davis desperately tried to stay on the lead lap. Art Wilson couldn't produce the formula that earned him the pole-sitter position, and he settled into a solid pace a fair distance back. With some aggressive driving and well-thought-out moves in traffic, Mandeville edged out Dispenza and Schaub to win the title by less than a second! The Stock Class really put on a great show, and the top four drivers turned in respectable 27-lap runs in heavy traffic.

(Continued on page 180)

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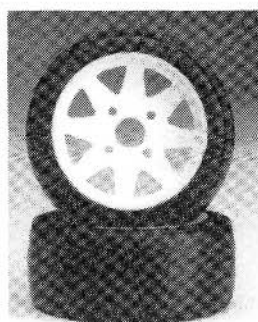
WHAT'S NEW

CORRECTION: we listed the wrong address for A-Main Racing in our March issue; here's the correct information:

A-MAIN RACING New Gear

A-Main Racing's exciting new gear for the JR-X2 will increase its top speed, acceleration and run time, and make it perform much more quietly. This is all owing to its specially designed gear teeth, bearing-race shoulders and lower rotating mass (approximately 1/2 ounce less than other gear). This A-Main gear has been hardened to reduce wear, and it's available for the Standard JR-X2, the Associated Stealth tranny and the A&L Power Clutch.

For more information, contact A-Main Racing, 3731 West 9th St., Overland Park, KS 66206.



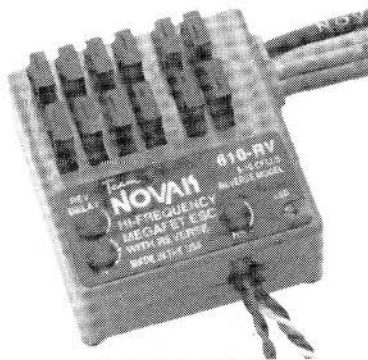
CUSTOM WORKS Rubber Capped Tire

This foam tire is capped with a rubber skin and mounted on Custom Works' no. 6051 Cyclone wheel. It fits the Dominator and will work well on hard-packed dirt ovals and concrete or asphalt tracks. One tire per package.

Part no. 6101

Price: \$18

For more information, contact Custom Works, 3720 Easton Dr. #7, Bakersfield, CA 93309.



TEAM NOVAK Speed Controller with Reverse

Now you can get Novak quality and performance in a speed controller with reverse. The 610-RV combines Megafet transistors (eight forward, four reverse) and Novak's custom digital IC chips. This ready-to-run, high-frequency controller has forward, reverse and brakes—all proportional! It has the lowest "on" resistance in its class, and it features the exclusive Novak Input Plug System and an adjustable reverse time delay from 0 to 4 seconds (during which time the brakes are applied before reverse comes on).

Part no. 1820

Price: \$165

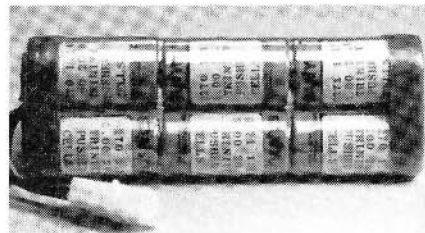
For more information, contact Novak Electronics, Inc., 128 C. East Dyer Rd., Santa Ana, CA 92707.



A&D RACING PRODUCTS Pro Pack

The A&D Pro Pack includes everything you need for a National-caliber battery pack: select cells, 2- to 6-inch pieces of A&D Pro 13 wire in black and fluorescent pink, Dan's Gold Bars, shrink-wrap and two sheets of decals.

For more information, contact A&D Racing Products, 12 Plaza 94, Suite 218, St. Charles, MO 63303.



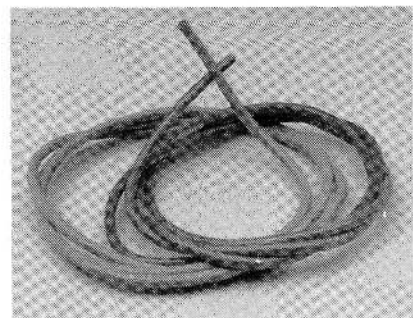
TRINITY Ready-to-Run Pushed Packs

Trinity's Pushed batteries are now available in 6-cell stick packs. High-quality Pushed Sanyo cells are conditioned to increase their capacity, improve voltage output and reduce the likelihood of failure. All the packs have dual-welded tabs and are covered with clear shrink-wrap. Their leads are of 14AWG, high-flex, multi-strand copper wire that's finished with a Tamiya-style connector. They're perfect for racers who don't want to solder their own packs.

Part nos. 5507 (1400mAh SCR 6-cell stick pack); 5508 (1700mAh SCE 6-cell stick pack).

Price: \$73.49; \$74.50.

For more information, contact Trinity Products, Inc., 1901 E. Linden Ave. #8, Linden, N



BOLINK 14-Gauge Wire

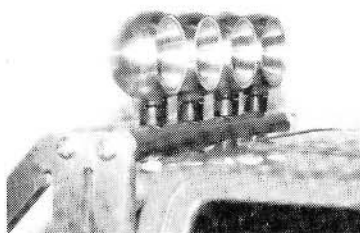
Bolink's new, 14-gauge wire can be used for all your electrical hook-ups and wiring needs. Each package includes one 3-foot piece of red wire and one of black.

Part no. BL-4636

Price: \$5.75

For more information, contact Bolink R/C Cars, Inc., 420 Hosea Rd., Lawrenceville, GA 30245.

Descriptions of new products appearing on these pages were derived from press releases supplied by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by Radio Control Car Action, nor guarantee product performance or safety. When writing to the manufacturer about any product described here, be sure to mention that you read about it in Radio Control Car Action.



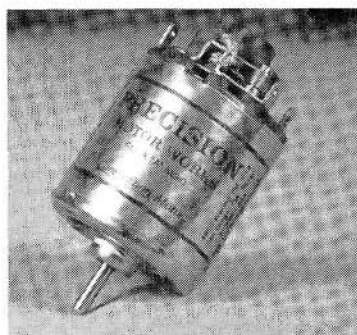
ESP Clod Buster Twin Tube Roll Bar

ESP's new twin-tube roll bar consists of two machined side plates and two aluminum tubes. It can be bolted right onto the stock or Lexan body and will accept four lights (with the use of the optional light mounting bar).

Part nos. ESP009 (twin-tube roll bar); ESP009B (light mounting bar).

Prices: \$36.95; \$4.95.

For more information, contact ESP Mfg., 20 Crystal Lake Plaza, Crystal Lake, IL 60014.



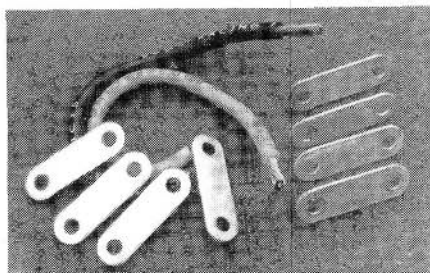
PRECISION MOTOR WORKS Monster Truck Racing Motor

Are you ready for a stock motor designed to put you in the A-Main? Each Precision motor is blueprinted, zapped, dyno-tested and ready to race, and its springs, brushes, timing and magnets are coordinated to produce the massive torque and high rpm needed for monster truck racing.

Part no. 1692

Price: \$28

For more information, contact Precision Motor Works, 4950 Waring Rd., Suite 12, San Diego, CA 92120.



BUD'S RACING PRODUCTS Barz Battery Assembly Kit

These one-percent-silver/half-hard-copper bars are silver-plated for better soldering and conductivity. Barz will carry all the power you can use, and they're reusable. The kit includes eight Barz and 4 inches of Bud's 14-gauge silicone wire.

Part no. 6924

Price: \$5.95

For more information, contact Bud's Racing Products, 1575 Lowell St., Elyria, OH 44035.

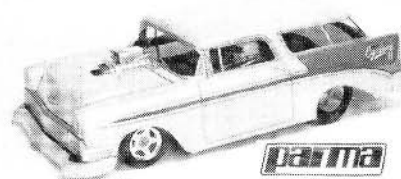


PRO-LINE King Cab Hop-Ups

The R/C industry's hottest new truck—the Tamiya King Cab—can easily be upgraded with Pro-Line's newest tires, wheels, bodies and accessories. The Pro-Line version of the King Cab was introduced at the IMS Show in Pasadena, CA, and it was a big hit! It has Pro-Line's Nissan Hardbody (part no. 3003), new five-blade directional wheels (part nos. 2551 and 2552) and race-proven Trac-Ta-Gator knobby tires (part no. 1045). All Pro-Line tires, wheels and accessories are designed for direct fit.

Price: \$7.95 to \$19.95.

For more information, contact Pro-Line, P.O. Box 456, Beaumont, CA 92223.



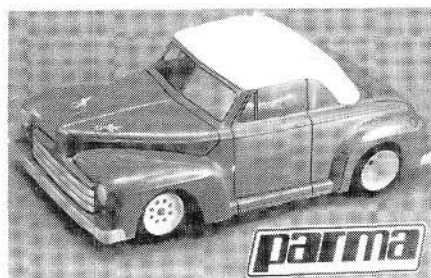
PARMA '56 Chevy Nomad

From mild to wild—the new 1/10-scale '56 Chevy Nomad is the way to go! With a traditional paint scheme, the details give it an "ultra-real" look. Drop in an injection-molded Parma Blown Hemi Kit with chrome plating (shown here), and you have a gleaming, screaming, radical street machine for concours competition!

Part nos. 10298 (clear '56 Chevy Nomad body); 10411 (1/10-scale hemi motor).

Prices: \$19; \$12.

For more information, contact Parma International, 13927 Progress Pky., North Royalton, OH 44133.



PARMA '47 Ford

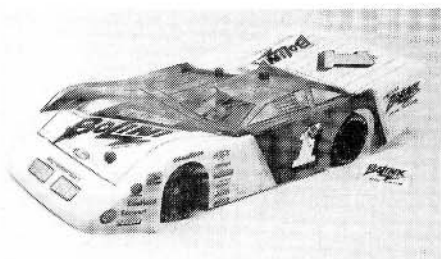
Parma's latest 1/10-scale "Classic" body is the '47 Ford convertible. Available in clear Lexan with outstanding detail, it's sure to be popular with "fat fender" lovers. It fits most 1/10-scale cars with the use of a no. 10450 body-mounting kit.

Part no. 10277

Price: \$19

For more information, contact Parma International, 13927 Progress Pky., North Royalton, OH 44133.

WHAT'S NEW



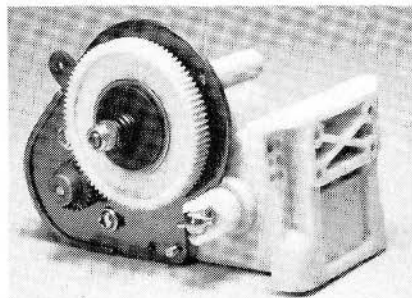
BOLINK Cobra Wedge

Bolink's new 1/10-scale Cobra Wedge dirt body is so low and sleek that it should be illegal! The Cobra body can be used on the Dominator, the SRP-1, the RC10, the JR-X2 and most other popular cars. Mount one and cheat the air!

Part no. 2338

Price: \$18

For more information, contact Bolink R/C Cars, Inc., 420 Hosea Rd., Lawrenceville, GA 30245.



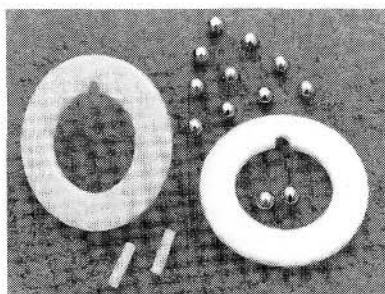
TRAXXAS New TRX Pro Series Transmission

Traxxas has introduced a new transmission for 1/10-scale off-landers. This design incorporates both a slipper clutch and a fully adjustable ball differential, and its low 2:72 final drive ratio is perfectly matched for use with monster-truck wheels and tires. The 48-pitch gears are molded of a special, self-lubricating material for quiet, efficient operation, and the drive-shaft outputs are positioned low to minimize the deflection angle of the U-joints.

Part no. 1920

Price: \$90

For more information, contact Traxxas Corp., 12150 Shiloh Rd., Dallas, TX 75228.



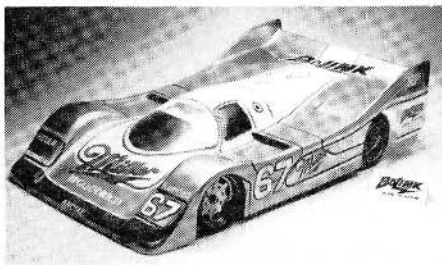
BUD'S RACING PRODUCTS Ceramic Differential Drive Ring Kit

These high-tech, precision-ground and polished superhard drive rings will give your differential supersmooth action and long life! The prototype set has completed more than 200, 4-minute runs and 2,500-lap enduros, and it still works like new. The rings are notched for pinning, and they come with a set of no. 2135 precision diff balls.

Part no. 2115

Price: \$24.95

For more information, contact Bud's Racing Products, 1575 Lowell St., Elyria, OH 44035.



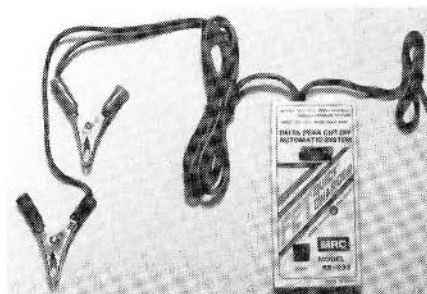
BOLINK 962 Porsche

Road racers, take note! Are you looking for one special roadcourse body that's everything you ever wanted? Look no farther; Bolink's new, 1/10-scale 962 Porsche is lean, low and ready to go. Remember; you don't have to be Andretti to drive a Porsche. Mount one, and make a run for the checkered flag!

Part no. BL-2337

Price: \$18

For more information, contact Bolink R/C Cars, Inc., 420 Hosea Rd., Lawrenceville, GA 30245.



MRC Delta Peak Charger

The MRC Delta Peak Economy Quick-Charger uses a sophisticated circuit to detect the peak-charge condition of 6- to 7-cell, 1200 to 1800mAh Ni-Cd batteries. Its one-button, 12V DC operation with fuse protection ensures safe, consistent charging. A two-color LED indicates when the charger switches over from quick-charging to trickle-charging. An electronic melody announces when the charger is properly connected to a 12V source and when Ni-Cd charging has been completed.

Part no. RB493

For more information, contact Model Rectifier Corp., 200 Carter Dr., Edison, NJ 08817.



TRINITY Hauler Bag

Trinity's large car-carrying bag is one of the best-looking bags on the market. It has three slide-in compartments to hold your car, parts and radio equipment. It comes in blinding fluorescent pink with black straps, and it has the Trinity Monster Horsepower logo.

Part no. 9030

Price: \$39.99

For more information, contact Trinity Products, Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036.

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FLORIDA CHAMPS

(Continued from page 166)

2WD OPEN I

Paul Schaub's TQ time was almost a lap faster than Tem Raskin's 2nd-place time. Schaub established a lead right from the buzzer, and he enjoyed his "hunted" role. Steve Minea made a nifty start and immediately took up the hunt. Although Raskin got tangled in traffic early on, he managed to stay on the lead lap. Jim Shea's solid 4th-place start was in vain, and his day was finished less than 30 seconds into the Main.

Schaub was really hooked up—holding off a charging Minea and Cliff Guest for the first 2 minutes. Guest made a bad choice in traffic and tangled with a back marker, and this allowed Raskin to get by for the 3rd spot. Schaub and Minea remained in front until Minea cut a corner and moved the flying Raskin up to 2nd. Schaub kept his distance as he and Raskin matched lap times in traffic. Raskin had the faster car, but the back markers held him back. His big break came just past the 3-minute mark when Schaub got together with a back marker in the second turn. This put Raskin within 20 feet of Schaub and the race was on to the finish.

These two drivers lapped the field at an unbelievable pace, and then with less than 15 seconds to go, Schaub ran into heavy traffic. As they came around for the last lap, Raskin moved right up on his bumper. Schaub held his ground through the first turn, but he couldn't keep it down going into the second, and Raskin slipped his car's nose just between him and the inside rail. The cars raced side-by-side and traded paint down the long, sweeping back stretch. With the finish line in sight, neither driver lifted as he turned toward it. Schaub went for a wild 360 just short of the line. Raskin held on and took the top spot, while Schaub crossed the line in cloud of dust. It doesn't get much better than that!

4WD OPEN

This event was short and sweet. Tem Raskin led from the pin and quickly showed his dominance. Third-place qualifier Gary Fulp kept it interesting for the first few minutes, and then he ran into some back markers and dropped off Raskin's blistering pace. With at least a two-lap advantage, Raskin was on cruise control while the rest of the field fought for the runner-up spot. Jim Shea made a late move for the 3rd place, but retired

(Continued on page 182)

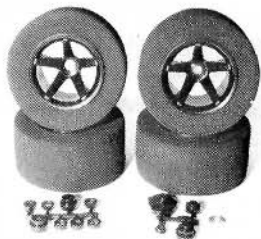
SUPER STAR MONSTER TRUCK —MOUNTED TIRES and WHEELS.

ONE FITS ALL!

THE ONE FITS ALL DESIGN ALLOWS YOU TO MOUNT THESE RIMS ON THE RC-10, JRX-T, TAMIYA NISSAN KING CAB, BLACK FOOT, OUTLAW, ULTIMA, AND MOST OF THE BEST SELLING OFF-ROAD CARS ON THE MARKET WITH "H" DESIGN HUB SYSTEM.

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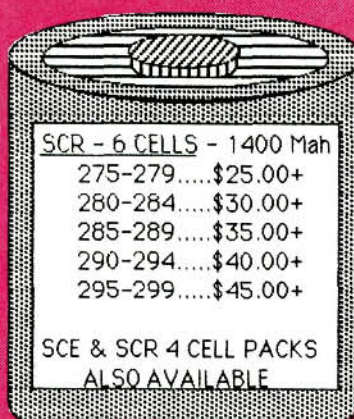
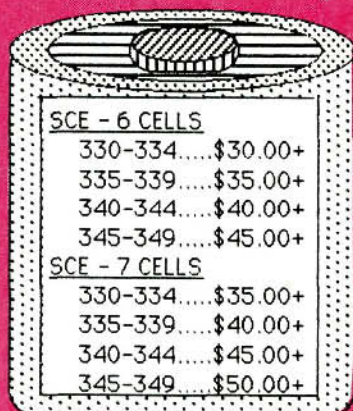


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FLORIDA CHAMPS

(Continued from page 180)

before the buzzer and dropped back to 4th. Fulp held for 2nd, and Justin McNeal moved up to 3rd.

OPEN TRUCK I

It's not easy to get 10 open-wheel trucks around a slippery track. The usual, "I'm-gonna win-the-race-on-the-first-lap" syndrome set in, and half of the field never made it to the first turn. Pole sitter Jim Terry and Steve Minea managed to break away from the field and wage their own battle for the top spot. The field settled down, but the slippery track conditions (at least, for the trucks) made passing difficult. With the action, it was surprising that only one vehicle dropped out: 4th-place qualifier Jerry Schindler was the only casualty (he only completed three laps). Minea worked the traffic to his advantage and put some distance between his car and the rest of the field. Terry wasn't as fortunate. His car went belly-up and subsequently fell a lap. Back in the pack, several drivers fought for position and Bob Whipkey, Mark Wright and Cam Crawford went at it for 4th place. When the dust had finally settled, it was Minea by a lap over Terry and two laps over David Secunda. Cam Crawford held on to the 4th spot.

OUTLAW SPRINT

On your mark; get set; hold everything! It was a good race until an overzealous corner marshal "did in" the scoring tower! With about 15 seconds left in the event(!), a car flipped just on the other side of the scoring bridge from the marshal, and the rest is history. When order had been restored (and the hangman's noose taken down), it was decided to re-run the race, and the racers went in search of the right setup.

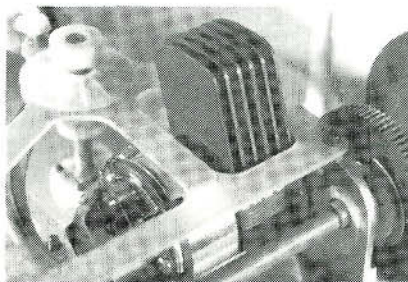
Team Pit Stop's Steve Minea had the holeshot at the buzzer, and he beat the field to the first turn. All the sprinters got away from the line cleanly this time, and there was plenty of action in the pack. J.R. Sitman worked his way through a road block at the 1-minute mark to take over the 2nd spot, and he was followed closely by Don Thompson. Thompson got tangled in traffic, while Minea and Sitman set the pace. Pete Jackson worked his way up to the 3rd spot until he spun out in traffic and dropped off the pace. At the halfway mark, it was still Minea in front with Russ Smith in 2nd after Sitman

(Continued on page 186)

NEW! Introducing The SuperCooler 2001

Made especially for the RC 10L

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FLORIDA CHAMPS

(Continued from page 182)

rolled on the back stretch. Bill Davis continued his charge to the front and worked his way past Sitman for 3rd.

Minea was on a wire as he opened up a 1-lap advantage over the field with less than 1 minute to go. Davis caught Smith in traffic and was on his bumper until Smith clipped a turn and barrel-rolled. Sitman got by again but hit a back marker and again lost the spot. Minea handled traffic beautifully and stretched his lead over Smith, who made another charge at Davis and took over the 2nd spot. Smith rolled again, but he was quickly on his way while Davis and Sitman got stuck in traffic. At the final horn, it was Minea with an impressive win in heavy traffic; Russ Smith held off Bill Davis to take the runner-up spot; Sitman and John "The Tub" Grubb rounded out the top five.

You can't run a successful race without the help of a dedicated track crew and sponsors. Jerry Landry and the Martin County R/C Car Club did a great job with the facility, especially when you consider the awful conditions on Saturday morning. The tri-oval clay track really came

(Continued on page 196)

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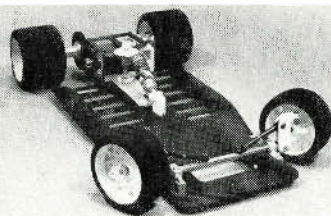
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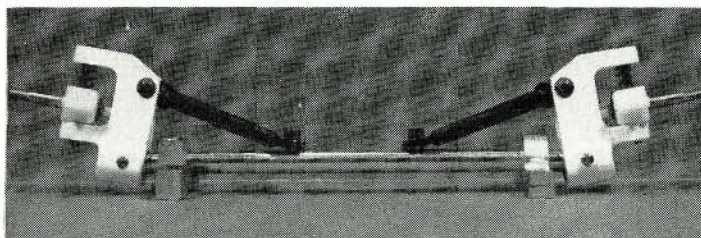
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FLORIDA CHAMPS

(Continued from page 186)

around, and the races were exciting. Thanks to all the sponsors for making this event possible: B&B Software, Eastcoast Racing Motors; Leading Edge R/C Racing Products; JG Manufacturing; CRM Racing, Inc.; Dan's RC Stuff; Twister; Magnum Racing Motors; Team Pit Stop; Raceway Hobbies; CKW; Revtech; Autographics; Condor Racing; Mikes Hobbies; Hobby Port and Race Prep. ■

DIRT DIGEST

(Continued from page 107)

foundation for that electronic knowledge, and I'll continue that theme next month. (No, I don't intend to write that column tomorrow. Even I have to do research sometimes!)

Naturally, there'll also be the usual hodgepodge of extras (I like to think of them as "high-octane" elements) that pop up from month to month. In the meantime, do your homework, and if you have to choose between racing and going to school, go to school. R/C stuff is only a hobby; school prepares you for life—and

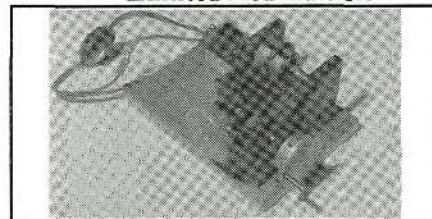
(Continued on page 198)

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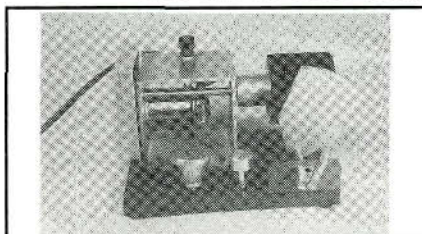
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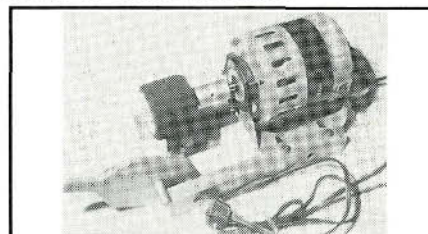


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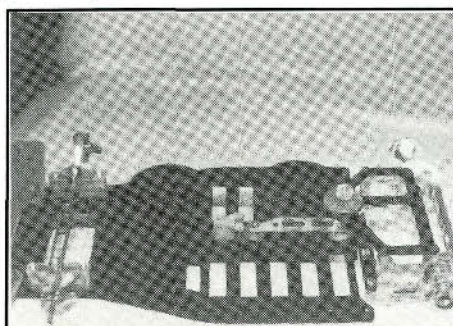


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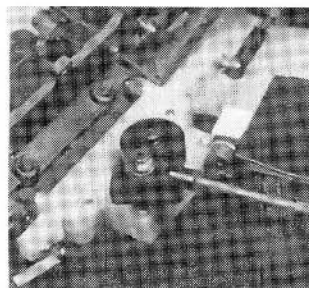
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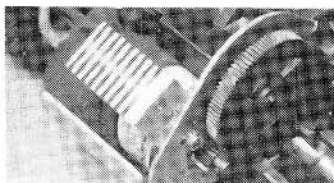
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DIRT DIGEST

(Continued from page 196)

life is more important. Until next month, keep your tail off the rail and your nose out of the dirt. See ya.

*Here are the addresses of the companies mentioned in this article:

Nova R/C Products, 851 N. Hacienda Blvd., La Puente, CA 91744.

Lazer Lite Racing Systems, Inc., 2090 SW 71st Ter., Unit #9, Davie, FL 33317.

Cermak Electronic & Model Supply, 107 Edward Ave., Fullerton, CA 92633.

World Engines, now ISC International, P.O. Box 40116, Indianapolis, IN 46240.

Gates Energy Products, Inc., P.O. Box 114 Gainesville, FL 36202.

ENFORCER

(Continued from page 115)

tried his hand at the controls, and his only complaint was that the Enforcer was too fast!

The engine was running on the rich side and wasn't working hard at all! Finally, we were all cold and decided to call it a day. In came the Enforcer and, with the engine running at idle, I lifted the hull out of the water and put it back on the dock. The prop was just turning over, showing that the idle setting was only barely too

(Continued on page 207)

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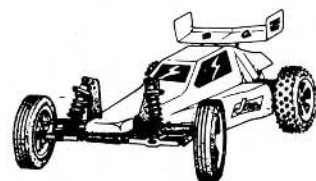
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ENFORCER

(Continued from page 198)

high. If the idle had been set correctly, the prop wouldn't have been turning and it wouldn't have presented a danger to anyone handling it. To kill the engine, I only had to close the choke. Time to go home!

RIVER RUNNING

Although the boat was impressive in waves, I wanted to see its smooth-water characteristics. The next day, we went to a wide part of the Housatonic River and launched this yellow water rocket. You should have seen the looks we got from fishermen as the Enforcer boiled the water!

Down the river, the current is slow, and the water always looks smooth. I took the boat out about halfway, turned it up-river and floored it! The Enforcer was instantly on plane and tracking straight and true. The only part in the water was about 6 inches of the aft hull, and it was running faster than the day before. At first, I slowed a little for the turns, but after a few laps, full-throttle turns were no problem. What a river racer! We had so much fun that we filled the tank three times. I re-

(Continued on page 210)

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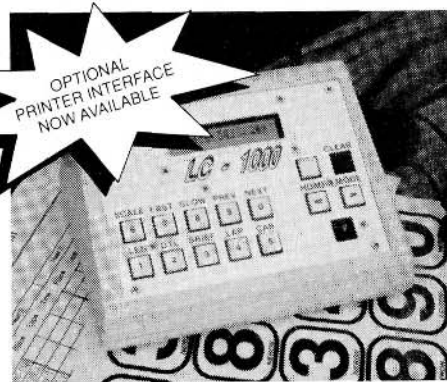
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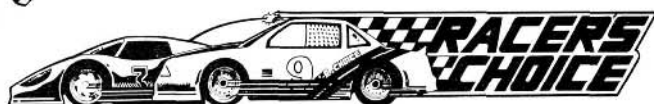
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ENFORCER

(Continued from page 207)

placed the radio batteries once, just to be safe, but we left after two hours, and I think the fishermen were glad to see us go!

COMMENTS

The weed eater engine has a lot going for it. The fuel it uses is much cheaper than glow fuel, and the runs last 100 times longer than those of electrics. The Enforcer's size impresses everyone and allows you to play in conditions that would keep other boats ashore. Consider that it's ready to run in less than five minutes, and its rather large price tag seems easier to take. You *do* have to pay if you want to play!

The Team Enforcer is a rugged model. Its drive components are manufactured by Octura Models* and use the Enforcer flexible drive cable with a new 1/4-inch prop shaft. (If you have to buy replacements, everything is readily available from Octura.) The new, water-cooled Quiet Power pipe is standard equipment and reduces noise very effectively. The boat can be bought without a radio, and it's race-legal under sanctioned rules.

The package I reviewed was very well put together, and it had many extras: 2-channel Futaba radio (\$104.95); two painted racing figures (\$29.95); side-guard molding strip (\$9.95); racing numbers (\$14.95); Splash decal set (\$24.95); deck and cockpit decal set (\$14.95). The total cost of my model?—\$1,114.75. (No wonder we had fun!)

The Enforcer is available in several versions with different price tags. Remember that all versions are completely finished and ready to run. I can think of only two changes to improve the Enforcer: I would have liked a waterproof on/off radio-switch extension that would go through the clear-plastic radio-box lid, and an auto-bailer or a removable drain plug would help keep the hull's interior a little drier. But again, these are only my observations.

This is one of the most impressive boats I've reviewed, and whether you decide on the Basic or the Deluxe version, you certainly won't be disappointed.

**Here are the addresses of the companies featured in this article:*

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Bold Creations	127	Neron Associates	207	Stage III	127
Bolink R/C Cars, Inc.	85,197	Novak Electronics	139	Stormer Hobbies	158-159
Bud's Racing Products	166	Ocean Pacific	194	Tammie's Hobbies	133
California Cheap Skates	153	Omni Models	188-189	TD Enterprises	164
Central Model Marketing	175	Paragon Racing Products	73	Team Losi	12-13,87,183
Cheetah Racing	196	Parma International	53,61,137	Tekin Electronics, Inc.	70
Competition Battery Sales	182	Performance Hobbies	156	The Finest R/C	116-117
Competition Electronics, Inc.	119	Periphex	138	Thorp Manufacturing, Inc.	98
Coverite	186	Powerline Cells	182	Tire Tech	54
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Endurance Racing Products	51	Product Design	157	Tower Hobbies	140-151
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Futaba Corp.	136	Racer's Choice	207	TRC	134-135
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Great Northern Hobbies	191-193	RAM	166	Twinn-K	49
Hobbico	C2,18,206	R.C.C.A. 401 R/C Tech Tips	91	Twister Motors	163
Hobby Etc.	196	R.C.C.A. Action Series Subscription	99	Ultra ⁵	130
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